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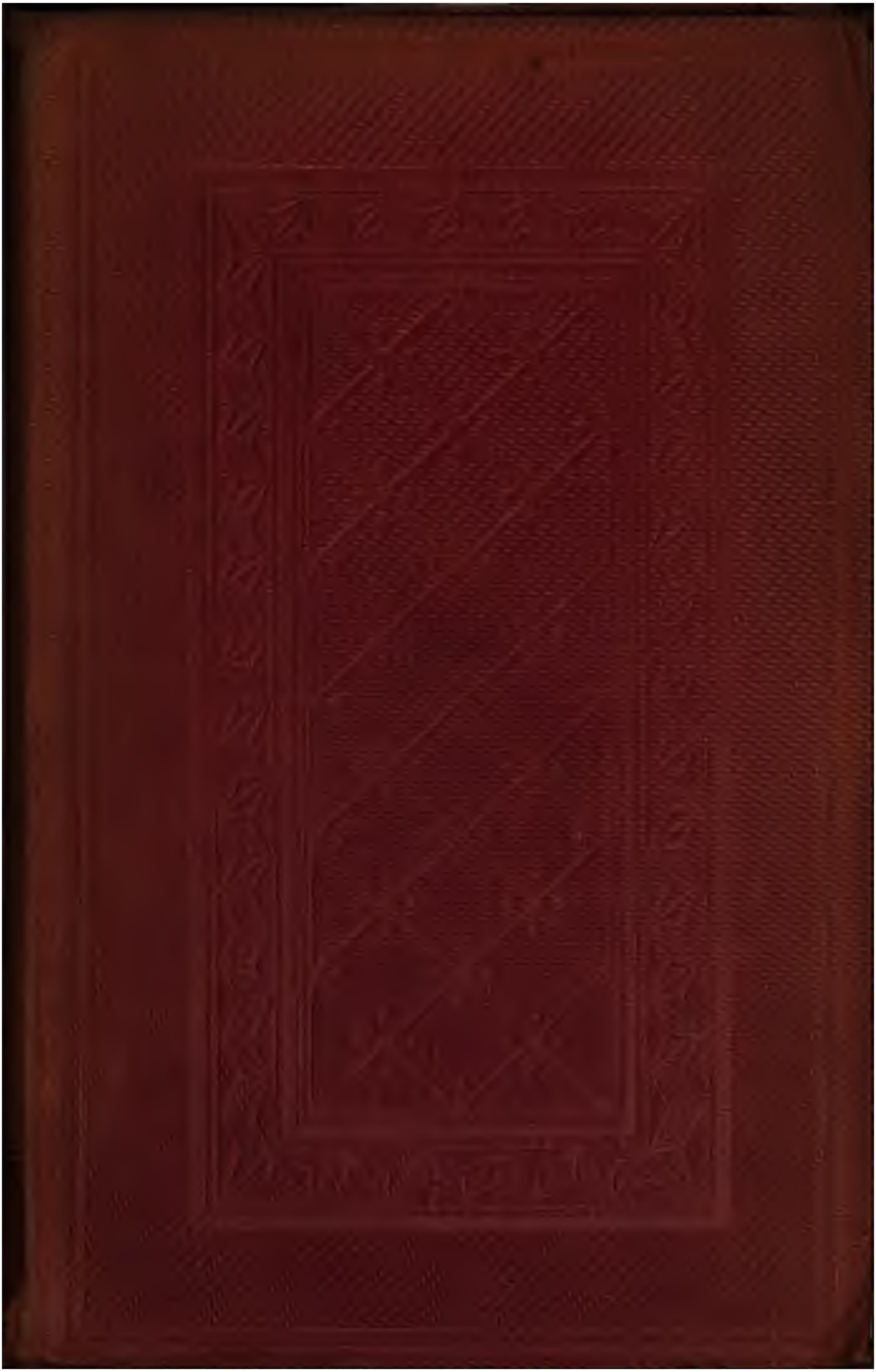

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A MANUAL

OF

MINOR SURGERY AND BANDAGING.

A MANUAL

OF

MINOR SURGERY

AND

BANDAGING:

FOR THE USE OF

HOUSE-SURGEONS, DRESSERS, AND JUNIOR PRACTITIONERS.

BY

CHRISTOPHER HEATH, F.R.C.S.,

ASSISTANT SURGEON TO, AND DEMONSTRATOR OF ANATOMY AT THE WESTMINSTER HOSPITAL; SURGEON TO THE WEST OF LONDON HOSPITAL, ETC.

SECOND EDITION.

LONDON:
JOHN CHURCHILL, NEW BURLINGTON STREET.
MDCCCLXII

~~150. e. 49.~~
160. g. 6.

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PRINTED BY J. E. ADLARD, BARTHOLOMEW CLOSE.

TO

WILLIAM FERGUSSON, F.R.S.,

PROFESSOR OF SURGERY IN KING'S COLLEGE, AND SURGEON TO KING'S COLLEGE HOSPITAL, ETC. ETC.,

This Book is dedicated,

AS A MARK

OF SINCERE PERSONAL REGARD,

BY

HIS OLD PUPIL AND HOUSE-SURGEON,

THE AUTHOR.

PREFACE TO THE SECOND EDITION.

THE first edition having been exhausted within a year, I have taken the opportunity of making a few alterations in, and additions to, the present edition which experience has suggested. Two short chapters have been added on the Immediate Treatment of Cases of Poisoning, and on the Mode of Reporting Cases, which will, I trust, be found serviceable. Four new woodcuts, illustrating more fully certain surgical appliances, will have the effect, I hope, of rendering the descriptions more easily intelligible.

CHRISTOPHER HEATH.

31, SACKVILLE STREET, W.
May, 1862.

PREFACE TO THE FIRST EDITION.

In writing the following pages, my object has primarily been to offer those young surgeons who are holding the responsible posts of house-surgeon or dresser in the various hospitals and dispensaries, some hints on the treatment of the numerous accidents and emergencies daily coming under their care. Having myself filled the offices of dresser and house-surgeon to a metropolitan hospital, and having, moreover, been a constant attendant at two such institutions since that time, I venture to hope that the suggestions here incorporated will be found serviceable. It has been my endeavour to avoid, as far as possible, the repetition of matter which will be found at greater length in the various handbooks of surgery, and rather to call attention to those minor points which are imparted only by oral instruction or are simply imitated from one's predecessors.

Although, for convenience, specially addressed to house-surgeons, I am not withont hope that these suggestions may be found serviceable by any who are anxious to gain a knowledge of the smaller details of surgery, which, after all, tend greatly to the success of surgical practice: and particularly by those who may not have had the opportunity of residing for a time within the walls of an hospital.

In the chapters on "Bandaging" and "Apparatus" I have endeavoured to avoid unnecessary complexity, at the same time, however, alluding to most of the appliances in common use in the metropolitan hospitals, the greater number of which I have visited with this special object in view.

The illustrations are all new and original, being careful copies, by Mr. Swain, of Bouverie Street, from photographs taken for the purpose, under my own superintendence.

I have to thank numerous friends for kind suggestions and assistance, and specially Dr. Anstie, for revising the chapter on "Chloroform," and Dr. Buzzard, for his artistic assistance with regard to some of the illustrations, and for selecting the pharmacopœial formulæ at the end of the work.

CHRISTOPHER HEATH.

31, Sackville Street, W.
April, 1861.

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MINOR SURGERY AND BANDAGING

FOR

HOUSE-SURGEONS,

&c. &c.

INTRODUCTION.

The office of house-surgeon to a public hospital is one of the most responsible posts a young surgeon can occupy, and, at the same time, its value in giving him both experience and confidence can be scarcely too highly estimated.

Before entering upon the more purely surgical duties of the house-surgeon, it may be as well to say a few words on his relation to the other officials of the establishment, to the patients, and to the public. Being resident, the house-surgeon has then the entire charge of all the surgical in-patients during the absence of the principal medical officers, and under his care also come all the casualties which may occur between the regular visits. This rule is modified in some hospitals by the fact that the Dressers are held responsible for the welfare of both in-patients and casualties, the house-surgeon occupying merely the post of a supervisor, who can be appealed to in the event of any special emergency; but, for brevity's sake, in the following pages the term house-surgeon is employed to signify the responsible and acting officer.

It is obvious that the above arrangement must modify materially the relative positions of house-surgeon and dresser; in the one case the dresser being entirely subordinate, while, in the other, he will act in a great degree on his own responsibility. It is not within the scope of this work, however, to enter into these minutiæ, which are sufficiently regulated by the traditions prevalent in each institution.

The relation of the house-surgeon to the VISITING-SURGEON varies also in different institutions, and with different individuals. Some visiting-surgeons wish to do everything themselves, and are very wroth if a house-surgeon has opened an abscess or tightened a bandage; while others allow their subordinates considerable liberty, provided the patients suffer no harm. Here, again, tradition and observation during student-life will enable the house-surgeon to keep clear of all collision with his superior officers, and he is certainly bound to respect the reasonable prejudices of the surgeon with regard to the details of his practice, and not attempt to bring the practices of two or three individual surgeons to one uniform level, by which all possibility of comparison would be lost.

It is most important, both for his own comfort and for the welfare of the patients, that the house-surgeon should keep on good terms with the non-medical portion of the establishment, ordinarily represented by a SECRETARY and a MATRON. These latter officers being permanent, and often of long standing, have naturally considerable power with the committee and governors at large, and have unfortunately also occasionally very strong views with respect to the manner in which the house-surgeon's duties are to be conducted; and it is sometimes difficult to venture in the least degree from the beaten track, even in a good direction, without offending their prejudices. A gentlemanly bearing and the exercise of proper tact will, however, often enable a house-surgeon to overcome difficulties at first sight insuperable, and I believe it will generally be found, that where a house-surgeon has got into "hot-water" with the officials, it has been owing to some false step or want of courtesy on his own part. Should the house-surgeon find, however, that he is interfered with in the proper discharge of his duties by any one, he is bound to state the facts to the superior medical officers, that the matter may be at once investigated and set right, for if any encroachment is permitted, the next occupant of the office may be still more harassed in the proper fulfilment of his charge.

It is to be hoped that the house-surgeon will never come into collision with the CHAPLAIN, seeing that the spiritual care of the sick is not within the house-surgeon's province, as such; the only difficulty I have known arise in this quarter is the tendency of some chaplains to prolong their visits to the wards, to the inconvenience of the dressers and others, but this can be easily remedied. The house-surgeon is bound to respect the privacy of a ward when prayers are being read, except in the case of sudden accident or emergency, when everything must yield to the necessities of the case.

Since most hospitals have medical schools attached to them, the house-surgeon, if so disposed, may be of the greatest possible service to the STUDENTS, by encouraging their visits to the wards, and by taking the trouble to give a little clinical instruction in making his rounds. This will prepare himself also for more formal clinical teaching, should he ever occupy the position of surgeon to an hospital; and since to teach is to learn, he can have no better way of improving himself in the practice of his profession. It would be well also if the house-surgeon would bear in mind this necessity for clinical observation, and take care that, when possible, the students should be summoned to witness any operation or remarkable accident, which may occur at other than the regular hour of the surgeon's visit. With this view, also, the house-surgeon might possibly be self-denying enough not to reduce all dislocations &c. *instanter*, when an hour's delay would not be of the smallest consequence to the patient, and would allow the students to see an accident such as they may be soon called upon to treat in private, and to witness its appropriate treatment at the hands of the visiting-surgeon. The house-surgeon must of course guard his patients against the meddling of ignorant students, and have due regard also to the comfort and privacy of the wards, especially those occupied by female patients.

Since the well-doing of the patients depends in no inconsiderable degree upon the good understanding between the house-surgeon and the NURSES, its maintenance should always be aimed at. Nurses often have views of their own with regard to the treatment of cases, which, if kept within proper bounds, may be of considerable service, for the inexperienced house-surgeon may not unfrequently gain useful hints from an intelligent woman who has been for years in the wards of an hospital; he must be careful, therefore, not to disgust his subordinates, in the first blush of office, by any sweeping revolutions or startling novelties. By an invariably courteous, and at the same time firm, behaviour, the house-surgeon will soon gain the confidence of nurses, who would, perhaps, prove insubordinate to a vacillating and rude officer, of even greater professional abilities. Two difficulties which are to be guarded against with respect to the nurses are, the tendency they have (in order to save trouble) to do all the dressings themselves, instead of leaving them for the proper dressers, and the exhibition of favoritism to certain patients. To obviate the former, the dresser must be careful to attend in proper time, so that the general business of the ward is not delayed, and the latter must be judiciously checked, or if necessary, may be prevented by transferring the patient to another ward. It can be hardly necessary to deprecate in the strongest terms any undue familiarity between the house-surgeon and the nurses or female patients, which no one who has any proper sense of honour would allow himself to indulge in for a moment.

The IN-PATIENTS are in most hospitals admitted under the surgeon of the week or day on which they may happen to apply, but invariably any case sent specially to any given surgeon is admitted under his particular care, and the house-surgeon should be careful to attend to this, as the infringement of the rule generally creates some ill-feeling. The division of the beds among the several surgeons will vary in different institutions, and there is generally an understood "give-and-take" arrangement which obviates all overcrowding.

Unless evidently perfectly clean, or unless the severity of the injury or disease prevents it, all in-patients should have a warm bath before being put to bed, and even when the bath is not available, as much dirt as can, should be removed by the nurse with soap and water. Except in the case of some very sudden emergency, a patient should never be put into the bed occupied by another without the linen having been changed, and, if at all soiled, the blankets also. (In all hospitals the rule is, that when a death has occurred the whole of the bedding should be changed.) The allowance of clean linen to each bed varies very considerably in different institutions, and a change will be required much more frequently in some cases than in others; but where the allowance is small, a neat appearance can be given to the beds by always placing a clean sheet first atop of the patient, and after a day or two shifting it to underneath him, and replacing it by another clean one, and so on. The house-surgeon should not consider the details of a patient's bed as *infra dig.*, since the latter's progress may materially depend upon his comfort in it. It will often make all the difference between a good and a sleepless night to a weary patient, if all crumbs, &c., are carefully swept out of the bed, and the sheets are thoroughly smoothed and tucked in on each side.

With regard to Diet, the house-surgeon has more liberty in some hospitals than in others, but should always endeavour to avoid extravagance, and particularly the continuance of large quanties of stimulants or extras after the necessity for their administration is past. A table of the diet-rolls of some of the metropolitan hospitals will be found at the end of the book. Some little skill will be necessary in order to suit the capricious appetite of a failing patient, and there is ordinarily no difficulty in obtaining special niceties for such cases, on making a representation of the facts in the proper quarter.

In the matter of Medicine, the house-surgeon should, as a rule, not commence a course of treatment without the sanction of the visiting-surgeon, and should he be obliged to make any alteration in the surgeon's absence, must be careful to inform him at his next visit, otherwise neither surgeon nor patient will have fair play. Even in cases where no medicine is required, it satisfies the patient's mind to have something on the medicine-card, and hence "℞ Haust. Sennæ co. ℥iss. pro re nata," is a useful prescription.

Fresh air is, perhaps, more necessary than medicine for surgical patients, and the house-surgeon should see that the ventilation of the wards is properly carried out, and, if necessary, that the windows are opened at certain periods of the day. The use of disinfecting lotions, &c., will do away with much of the offensive odour of unhealthy wounds, and, if necessary, cloths soaked in some disinfecting fluid may be hung round a patient's bed, or the fluid be sprinkled on the floor. The waterclosets and urinals in connection with the ward should be occasionally inspected, to see that they are perfectly sweet, and, when the bed-pan is used in the ward, it should contain a little disinfecting fluid or powder, and be emptied immediately after being used. Those patients who are able to do so should be encouraged to go out into the fresh air, and all who are able, should be out of bed during the day-time, and, if not strong enough to be thoroughly dressed, may lie outside it with advantage.

The prevailing custom of constantly scrubbing the floors of the wards with soap and water, has a decided tendency to maintain a most unhealthy atmosphere, particularly in the winter months. The practice of polishing and dry-rubbing the floors would be a great improvement, and is said (*e. g.* at Birmingham) to have a direct tendency to reduce the mortality from erysipelas, &c.

The house-surgeon should make an invariable rule of seeing all cases of Accident as soon as he is called to them. In by far the majority of cases a few minutes' delay would be of no consequence; but as it is impossible to say when the highly urgent cases may occur, the house-surgeon—having due regard to public opinion and the verdict of a coroner's jury—should always give his immediate attendance. The question of the necessity for the admission of a case of accident is sometimes a matter of doubt, and will be influenced a good deal by the number of vacant beds, &c., but in doubtful cases it is much better to err on the safe side, and take in a patient for a day or two, than run any risk of mischief occurring during treatment as an out-patient. This is especially advisable in any case brought by the police, and likely to be the subject of legal investigation. Cases present themselves occasionally at hospitals which are obviously unfitted for admission, either from being incurable, or from the fact that they are suffering from want rather than disease. These, if summarily dismissed, may be bandied about between workhouse officials, until (as has positively occurred) the unfortunate has died of inanition in the streets. A coroner's jury, finding that admission was refused to a patient in a dying condition, will naturally lay the *onus* upon the house-surgeon, whom it behoves, therefore, to take some little pains to avoid such a *contretemps* by calling the attention of the lay officials to the case, who will at least give some nourishment to the applicant before he is dismissed, and possibly take steps to secure his immediate admission into a suitable asylum.

A house-surgeon is a good deal pestered for CERTIFICATES of illness for clubs, &c., and should be provided with printed forms, which can be readily filled up. Caution should be exercised in giving certificates to the police (except when a patient is unable to appear), since the house-surgeon may lose a fee by not having appeared in person at a police-court.

The following are the principal points of LAW affecting the house-surgeon.

The house-surgeon cannot claim any fee for evidence at an inquest upon a patient who died *in* the hospital, and it is sometimes a nice point to decide whether a death took place outside the hospital doors or not. If the subject of the inquest *was* brought in dead, the house-surgeon is entitled to one guinea for giving evidence, and one for the post-mortem examination, provided the coroner has given an order for it to be made; and the house-surgeon should be careful not to give evidence without receiving a summons in due form, and particularly not to make a post-mortem without a written order, or he will forfeit his fees. The house-surgeon must give evidence before a magistrate, if summoned, and there is no fee allowed unless the case is sent for trial, when half-a-guinea will be allowed for each day's attendance at the police-court, and it is as well to ask the magistrate to enter the attendance at the police-court upon the depositions, so that there may be no mistake after the trial. Although the magistrate has no power to give a fee for evidence on a case which is not sent for trial, the fee of a guinea may be obtained (as I have myself experienced) by writing a formal letter to the Secretary of State for the Home Department, Whitehall, stating the circumstances, when in a few days, probably, an order will be received for payment of the fee. At assizes or sessions the house-surgeon is bound to attend on the day he is summoned, and to wait until he is called on, and is allowed a guinea a day for such attendance, and reasonable travelling expenses if he has to go any distance. The fees (including those due for the police-court) are paid as soon as the trial of the case is concluded.

In civil actions the fee will vary according to the liberality of the attorney, but will never be less than a guinea a day, and when served with a *subpœna* to attend the house-surgeon should receive a guinea, or is not bound to pay any attention to it. When there is doubt of the respectability of the parties, it is well to insist upon having the fee before giving evidence; or, if the attorney refuses this, the house-surgeon should appeal to the presiding judge *before* being sworn, when the judge will direct that the usual fees should be paid. By taking this course of appealing to the judge, I succeeded once in obtaining the fees for giving evidence in an "attorney's action," when a medical friend, who neglected the precaution, failed to obtain any remuneration.

In the county-court seven shillings and sixpence is the fee for a medical witness.

In order that a house-surgeon may fulfil his duties efficiently, it is essential that he should be careful of his own health. The labour, anxieties, and foul air of an hospital produce an effect upon the strongest constitution in a few weeks, and unless the house-surgeon takes proper care of himself he will very soon be disabled. A daily cold bath and a daily walk are the great means for maintaining the health and spirits; the walk, particularly, is essential, and is very apt to be shirked, either from want of energy or from over-anxiety for the welfare of the cases. This over-anxiety is not only injurious to the house-surgeon himself, but is bad for the patients also, since it leads to over-frequent visits to the wards, constant change of treatment, and a general state of worry. The house-surgeon should be satisfied with the consciousness of having done his best for his patients, and must be content to leave the result *in other hands;* and though, no doubt, it is annoying to lose patients in whom one has taken a great interest, it is only what must be encountered in after years in private practice.

A good night's rest is most important for the house-surgeon, but where he is in sole charge of the hospital its attainment is very precarious. On Saturday nights it is, perhaps, of very little use for a house-surgeon to retire early, since the number of broken heads, &c., is generally large at that time; but on other nights there can be no object in sitting up to unreasonable hours, and even half an hour's sleep in bed is better than twice that time in an arm-chair. When the house-surgeon is called up in the night it will be as well for him to take the opportunity of visiting one or two of the wards occasionally, to see that the night-nurses are on the alert, and to soothe any sleepless patient.

In order that the house-surgeon should get through the hard work, both mental and bodily, of his office, it is essential that he should be liberally fed. Committees are not aware sometimes of the hardships they inflict by penuriousness with regard to the medical officers' table, and, in my experience, a house-surgeon, who does his work *thoroughly*, requires "meat three times a day." The first symptom of "knocking up" is an inability to eat breakfast, which is a most important meal for the house-surgeon, as he has all his rounds to make immediately afterwards; and this is soon followed by a relaxed sore throat (hospital sore throat) and a general feeling of depression. An extra allowance of fresh air, by either walking or riding, a couple of glasses of wine, and the internal administration of bark and mineral acids, are the remedies for this state of things, and unless they are soon had recourse to, the house-surgeon may have to throw up his appointment altogether, and seek for health and strength in country air.

CHAPTER I.

HÆMORRHAGE.

HÆMORRHAGE from various sources is one of the affections which the house-surgeon is called upon to treat most frequently. Its amount may vary from what is termed "trifling" to "alarming," but it will probably be of service to the young surgeon if I say that there is, I believe, no hæmorrhage from the external surface of the body which cannot be arrested, at least temporarily. The ligature and pressure are the two means of arrest in most common use, although the latter (in its varied forms) is not so fully appreciated as it deserves; but recourse must be had occasionally to escharotics and styptics of various kinds, of which the actual cautery is the most potent. The position of the wounded part has considerable influence on hæmorrhage, and should therefore be fully attended to, since, for example, it is obvious that blood will flow more readily from a limb which is allowed to hang down, than from one which is raised to, or above, the level of the heart.

The after-treatment of cases of hæmorrhage, both as respects the wound and the general condition of the patient, is of the greatest importance. Supposing an artery to have been tied on a bleeding surface, no surgeon would think of removing the ligature on the following day; but if pressure alone has been applied to the wound, it must be still more necessary not to interfere rashly with the dressings, and so disturb the natural process of occlusion of the injured vessel. If the hæmorrhage does not recur, there can be no necessity for removing the pads, &c., until they are loosened by suppuration commencing in the wound, although it may be advisable to relax the bandages, (of necessity tightly applied in the first instance) after a day or two. Perfect rest of the wounded part, and, if possible, an elevated position, are absolutely necessary for successful treatment, while at the same time the whole system must be brought into a condition most likely to conduce to the formation of clot in the vessel, and the rapid granulation of the wound.

The constitutional treatment of cases of severe hæmorrhage is one of the most anxious cares of the surgeon. On the one hand, there is the immediate danger of the patient's death from exhaustion, and on the other the fear that by over-stimulation the hæmorrhage may be again induced with equally dangerous effect. It is in these cases that opium is of the greatest service. From half to one grain, in frequently repeated doses, will do much to calm the patient's nervous system, and mitigate the injurious effects of loss of blood. Stimulants may be cautiously exhibited provided surgical means have been taken to arrest entirely the flow of blood, but where, from the nature of the injury, that has been impossible, it would be destruction to the patient to excite immediately the action of the heart, and thus destroy nature's means of arrest. A previously healthy patient will survive a state approaching syncope for many hours, and ultimately make a perfect recovery, while early and injudicious stimulation would have hurried him uncontrollably to the grave. Reaction after hæmorrhage is not usually of a violent character, but, if necessary, may be treated by gentle purgation and small doses of digitalis; tartar emetic can be but rarely required.

Among the debilitated patients one meets with in hospital practice, anæmia is the difficulty which stands in the way of recovery from a wound. It is in these cases, when the blood seems scarcely able to coagulate, and there is a constant oozing from the wounded surface, that the preparations of iron in frequent doses have such a hæmostatic effect. Of these the Tinctura Ferri Sesquichloridi seems the best medicine for the purpose, and this, together with small and repeated doses of wine, and a light, dry, diet, will materially assist in the recovery of the patient.

Hæmorrhages may be conveniently divided into those which are caused by accident, and those which result from disease or follow surgical operations.

HÆMORRHAGE FROM ACCIDENTS.

Scalp wounds are very common in hospital practice, and from the vascularity of the part generally bleed freely. If no large artery (temporal or occipital) is wounded, pressure alone will be sufficient treatment, which is best applied by putting the edges of the wound in apposition (without stitches), placing a pad of *dry* lint upon them, and applying a bandage firmly over the cranium, with a turn or two under the chin to keep everything tight (fig. 30). The hair in the neighbourhood of the wound should be cut close, and the immediate edges shaved, so that both the extent of the injury may be clearly seen, and the apposition of the edges may not be interfered with. Should one of the arteries be *divided*, so that the ends are able to retract, pressure will still suffice; but if the vessel is only *wounded*, it should be thoroughly divided with a lancet before the edges of the wound are brought together. It is very difficult to apply a ligature on the scalp, and with the above precautions it is seldom, if ever, needed. Scalp wounds may, of course, be accompanied by fracture of the skull, which should therefore be borne in mind, and the hæmorrhage in these cases may come from within the skull, and be beyond the surgeon's control.

Wounds of the face bleed freely, and frequently require a ligature, though pressure can be very well adapted to the parts above the jaws. *Collodion* will frequently arrest the hæmorrhage from small cuts, if applied in the following way. Grasp the part wounded between the fingers and thumb, so as to blanch it, clean the wound, and put the edges in apposition, drying them thoroughly with a soft rag. Then paint on the collodion, making it cover the skin for some distance around the wound; let a firm hold be maintained until the collodion is perfectly dry, and then, having allowed the parts to resume their proper position, paint another coat over all. A very good form of collodion is made by dissolving gutta-percha in chloroform with a gentle heat, and has the advantages of adhering longer, and of not creating so much smarting when applied, as the common preparation. To attempt to paint collodion on a wet surface, or while the blood is running, is worse than useless, and the same may be said of the application of adhesive plaister under similar circumstances, if warmed in the ordinary way; but, if immersed in boiling water, and carefully applied with a little pressure with a cloth, the plaister will be found to adhere, and to control the hæmorrhage to some extent. If adhesive plaister be applied during the process of granulation, it is best done in a number of narrow strips across the wound, each strip slightly overlapping the preceding one. Sutures will sometimes be required in wounds of the face, in order to diminish the width of the scar, and if so, very fine silk or the metallic sutures now in common use are the best.

Cut lip.—Either lip may be cut through by a blow or fall upon the teeth, and the hæmorrhage from the divided coronary artery is generally profuse. The introduction of a harelip pin and the application of a twisted suture form the best treatment, but care must be taken to pass the pin sufficiently deep in the substance of the lip to transfix, or at least go close to, the bleeding orifices of the artery, otherwise hæmorrhage may still go on into the mouth. Unless a piece should have been cut (or bitten) out of the lip, there will be no difficulty in properly adapting the edges of the wound, but the surgeon should bear in mind, as in the operation for hare-lip, that his proper guide is not the red border of the mucous membrane, but the *line* where the mucous membrane joins the skin. Collodion may be usefully applied over the twisted suture when the ends of the pin have been cut off. Two days are generally sufficient for the pin to remain in the lip, but the scab should be left untouched until it drops off spontaneously.

Bleeding from the nose, the result of a blow, is generally slight, and may be alleviated by the application of cold water, although the usual position assumed by the patient, that of bowing the head over the basin, is little calculated to assist in its arrest. It is much better to make the patient sit erect and hold a sponge to the nose, or in slight cases snuff up the cold air, which will often prove sufficient.

Bleeding from the ear after a blow, is generally caused by slight rupture of the lining membrane of the meatus, and must not be taken as a symptom of fractured skull, unless other more sure evidence accompanies it.

Bitten tongue may give rise to severe hæmorrhage if the wound happen to be in the thickness of that organ. Ligatures are of little avail, as they almost invariably pull off, and if cold does not arrest the flow of blood, the actual cautery applied to the bleeding points will be the best remedy. Sutures are difficult to apply, and are of very little use in wounds of the tongue; and unless the piece is nearly severed from its connections, so that the surfaces of the wound are unlikely to come into apposition, it is better to trust to nature and the healing powers of the saliva.

Teeth knocked out seldom give rise to severe hæmorrhage of any duration, and cold water forms the best treatment. If the tooth (particularly an incisor) is sound, an attempt should be made to replace it in the socket, as it may possibly become again attached. A piece of silk should bind it to the neighbouring teeth, in order to keep it in position.

Cut throat,—If the large vessels of the throat are divided by the knife, immediate death will ensue before the surgeon is called; but this is not a common occurrence, for attempts at suicide being generally made in the space between the hyoid bone and thyroid cartilage, the incision does not go near the carotid arteries. There is often sharp hæmorrhage at first from two or three small arteries if the incision is severe, but this may easily be arrested by ligatures, if the cold air has not already been sufficient to stop the bleeding. The incision will vary considerably both in size and depth; an incision from "ear to ear" may be only skin-deep, while another of smaller extent may have divided the trachea, and even the œsophagus. The patient is generally in a very depressed condition, partly the result of loss of blood, but mainly owing to the mental condition which gave rise to the attempt, aggravated occasionally by bodily want. In this case it may be advisable to administer at once a small quantity of nourishment, such as a couple of table-spoonfuls of beef-tea and one of brandy, and repeat it at short intervals. If the pharynx is uninjured, this can be readily swallowed, but if it is wounded (it is very seldom entirely divided) the stomach-pump must be used, the tube being introduced with great care, and the finger, if necessary, inserted in the wound to ensure its taking the right direction.

No sutures must be placed in a cut throat. This is important, as the friends of a patient are always very anxious to have the throat "sewn up," but such a practice is very dangerous, as it would cause any blood which might be effused to enter or press upon the windpipe, and, by retaining blood or pus within the wound, would prevent its granulating from the bottom.

The position of the patient is the great thing for effecting a cure. If the first faintness has gone off, and all hæmorrhage has ceased, the patient's shoulders should be raised by pillows, so as to make the head bow forward, and if the necessity for this position be explained to the patient, it will be found sufficient, provided he is sane. In insane or unruly cases it will be better to carry a bandage round the forehead, and bring the ends from the temples down to a waistband in front.

The great danger in cases of cut throat, after the immediate consequences of hæmorrhage and shock are passed, is inflammation of the lungs and air-passages, owing to the entrance of cold air through the wound. This is best obviated by the application of hot moist flannels, folded and laid lightly over the wound, and renewed as often as they become cold or dry. The flannels tend to help the granulating process, and after a day or so the patient can be taught to apply them himself so long as they are necessary. Great care must be taken to support the patient's strength during the first few hours after the injury, by the administration of food and stimulants by the mouth, if possible, or, if not, by enemata per rectum.

Ruptured frænum.—Patients have been known, on several occasions, to apply at an hospital faint from loss of blood caused by a rupture of the *frænum preputii.* Since the continued bleeding depends upon the fact that the little artery of the frænum has been only partially divided, the obvious treatment is to snip it across with a pair of scissors, when the hæmorrhage will cease immediately.

Stabs may be inflicted in various parts of the body, and give rise to a varying amount of hæmorrhage.

(*a*) *Stabs in the throat* may be treated on the same principles as cut throat, viz., to stop the bleeding and let the wound heal from the bottom without stitches. A complication which may arise in stabs of the throat is where the knife has perforated the trachea, and emphysema is produced, owing to the wound not being sufficiently large or direct for the air to escape through it. A pad of lint and a bandage, gently applied, form the best treatment, and the amount of emphysema is generally but slight.

(*b*) *Stabs in the chest* may produce hæmorrhage by wounding (rarely) an intercostal artery, or the lung. An intercostal artery may be twisted or tied, and seldom gives much trouble. Wound of the lung (generally shown by bloody expectoration) may be irremediably fatal from hæmorrhage, the blood either pouring from the mouth or choking the lung, or more rarely filing the pleura and compressing the lung. The great object is the immediate arrest of the hæmorrhage, by the inhalation of the vapour of turpentine, sprinkled on a handkerchief, the application of cold both to the surface of the chest and by swallowing ice, and lastly by venesection if necessary. Venesection for this purpose should be performed while the patient is supported in the erect posture, and the blood should be drawn from a large aperture, so as to induce a fainting condition as rapidly as possible, and care must be taken that the patient be not allowed to recover his heat and rapid circulation too soon, or the hæmorrhage may recur. An early opportunity should be taken of administering one of those drugs which have an hæmostatic tendency (*e. g.*, Plumbi Acetatis, gr. j, in pil.; or Acidi Gallici, gr. v), in repeated doses.

(*c*) *Stabs in the abdomen* may give rise to hæmorrhage from wounding vessels in the parietes, and these can be easily secured; but apparently slight wounds may perforate the peritoneum and wound the intestines, giving rise to internal hæmorrhage. Simple wounds of the parietes should be closed with plaister or sutures, and collodion painted over all, so as to exclude the air. The sutures (wire) should be made to go through the whole thickness of the wall and peritoneum, so that the two surfaces of the serous membrane may be brought into immediate contact. Intestines, if wounded and exposed, should be stitched up with fine silk and continuous suture, provided the mucous membrane has not already protruded through, and so filled up, the wound. Whatever the injury, the sooner the patient is got fully under the influence of opium the better, so as to guard against peritonitis.

Wounds of arteries require varied treatment according to the size of the vessel and the kind of injury inflicted. Fortunately, these injuries occur mostly in the extremities, where pressure can be readily adapted to the limb, and it is to pressure alone that recourse should be had in many of the wounds of small vessels.

Wherever there is sharp hæmorrhage, probably arterial, from a wound, pressure should be immediately made upon the main artery with the fingers, so as to stop the bleeding temporarily. This immediately relieves the anxiety of the patient and friends, and also permits a careful examination and cleansing of the wounded part with *cold* water. If this is done deliberately, and the wound is further exposed for a few minutes to the air, possibly, on the relaxation of the pressure above, no further hæmorrhage will take place. Should it return, however, careful inspection should be made to discover the bleeding point. Supposing this possible, which is not always the case, and a bleeding orifice to be discovered, if of large size, a ligature may be applied, or if small, pressure may be adapted in the following manner:—An assistant again holding the main artery, and the wound having been again thoroughly cleansed, the surfaces should be laid together and a pad of *dry* lint placed over the wound and adjacent skin, so as to press the cut surfaces closely together. A bandage, carried first round the limb for some distance below the wound, should be applied tightly over the pad, and then be carried a short distance above the wound, additional pads being placed, if considered necessary, along the course of the principal arteries, so as to exert pressure upon them.

Should bleeding again occur, *graduated pressure* may be used in the following way:—The main artery being held as above described, the wound is to be laid open, and a small pledget of folded lint placed at the bottom; on this another pledget, rather larger, and so on until the lint is an inch thick above the skin, pressure with a bandage being then exerted on the whole, with the same precautions as before. The disadvantage of this otherwise very effective method is, that the wound must necessarily be allowed to granulate from the bottom, thus occupying a longer time in healing, and leaving a larger scar.

The position of the limb after the application of pressure is of the greatest importance: thus the hand should be raised by a sling to the opposite shoulder so as to flex the elbow, while the foot and leg should be supported above the level of the body by means of pillows.

(It is never sufficient simply to tell a patient to keep a wounded or inflamed arm in a sling, for the limb is then generally allowed to hang down, but the surgeon should himself see that the hand is raised to the opposite shoulder.)

The above directions are only applicable to wounds involving the smaller arteries of the limbs. In cases of injury of the main trunks, the profuse hæmorrhage should be instantly controlled by pressure of the finger upon the artery above the wound, until a tourniquet can be applied, which, although it arrests the rush of arterial blood, will very probably still leave a strong current of dark-coloured blood ebbing out of the wound. This blood, which may come from the lower end of the wounded artery, from the vein, or from both, will be immediately controlled by another tourniquet placed below the wound, until the assistance of the visiting surgeon can be obtained, since operative interference of some kind will certainly be required.

Patients who have received, a few days before, a wound of the principal artery, which has been treated by bandaging, are occasionally brought to an hospital on account of a continual oozing, or perhaps a sudden gush of blood; and on examination a tumour is found in the limb, with a small orifice from which the blood emerges. I would caution the house-surgeon against interfering with such a case further than to put a tourniquet on the artery; for the tumour is probably a false aneurism of large size, and will require an operation of no small moment for its cure.

Wounds of the palmar arch are sometimes laid great stress upon, as if their treatment differed in any way from that of wounds of arteries generally. Graduated pressure, properly applied and maintained, together with flexion of the elbow, may generally be relied on, provided the parts are not interfered with and the dressings disturbed too early.*

Wounds of veins give comparatively little trouble, and the hæmorrhage is readily arrested by pressure, if the vein is of moderate size. A ligature may occasionally be required on a large vein, and may be applied without much apprehension as respects phlebitis, &c.

HÆMORRHAGE FROM DISEASE.

Bleeding may occur from vascular or malignant growths on the surface of the body, and, from the low condition of the patient, it may be highly desirable that as little blood as possible should be lost. As the source of the hæmorrhage is generally rather a surface than any one bleeding vessel, the ligature is seldom applicable, and from the nature of the case pressure can hardly be applied; hæmostatics therefore must be employed, such as the Tinct. Ferri Sesquichloridi, the solid Nitrate of Silver, and Nitric Acid, or in extreme cases the actual cautery.

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* See a case of wound of the palmar arch, in which the dressings were removed *every morning*, with the following results; —ligature of the radial; ditto of brachial; amputation of arm: pyæmia and death! 'Lancet,' May 27th, 1859.

In dealing with vascular growths, it will be advisable to surround the mass with a ligature, and tie it by one of the numerous methods described in surgical works, or more simply by passing a needle or hare-lip pin beneath the bleeding tissue, and then carrying a thread around its extremities in a figure of eight.

Epistaxis, or hæmorrhage from the nose of spontaneous and constitutional origin, may be treated *locally* by the application of cold to the head and face, by the inhalation of vapour of turpentine, or by the use of powdered alum as a snuff. In severe cases, plugging of the nostrils may be required.

Hæmorrhage from the rectum, generally the result of gorged hæmorrhoidal veins, may be treated by enemata of cold water, or some astringent decoction, such as the Decoctum Quercûs. If very severe, the bleeding point may be touched with nitrate of silver or the actual cautery through a speculum, the rectum being afterwards carefully plugged with lint, to which a string should be attached to prevent its getting out of reach. Careful after-treatment will be requisite to relieve the loaded condition of the vessels. Hæmorrhage from the bowel in children is not unfrequently caused by a polypus in the rectum, which will require removal before the affection will be cured.

Hæmorrhage from the bladder may result from disease of its coats, or from the presence of a stone. The injection of cold water through a catheter will generally suffice, the instrument being retained in the urethra, so as to allow any blood which may flow to escape at once, and not coagulate in the bladder. In severe cases, weak astringent solutions may be injected, and ice be placed in the rectum and about the pubes. An early opportunity should be taken to ascertain the presence of a calculus by means of the sound, and if it exists, the patient had better be at once admitted into the hospital, or very possibly, the hæmorrhage having ceased, he may never appear again for the necessary treatment.

The following will assist the house-surgeon in arriving at a correct diagnosis as to the source of bloody urine. If the blood comes from the kidney, it will be thoroughly mixed with the urine, rendering it smoky if in small quantity, or dark red if more abundant. When the hæmorrhage is from the bladder, the first portion of the urine may be pretty clear, and the blood will be clotted and more abundant as the organ contracts. If from the urethra alone, it will be found that the first gush of urine is mixed with blood, but that afterwards it is clear, being again bloody at the last, when possibly a few drops of nearly pure blood may be ejected. Blood from the urethra, if in quantity, will trickle out before any effort at micturition is made.

Ruptured varicose veins in the lower extremities give rise to dangerous hæmorrhage. The patient may be unaware of the accident, and fall down in a fainting condition, which may rapidly become fatal if not attended to. Pressure upon and below the wound immediately stops the bleeding, but the limb should be carefully supported in an elevated position for some time after the accident, to prevent its recurrence. The veins of the labia sometimes give way in pregnant women: cold, the horizontal position, and pressure, form the appropriate treatment.

Ulceration and sloughing may give rise to very severe and even fatal hæmorrhage by opening into a large vessel. Here the temporary arrest by pressure on the main trunk, and the subsequent adoption of the treatment proper for wounds of arteries (p. 19), must be had recourse to; although in some localities, as in the throat after scarlet fever, &c., the hæmorrhage is beyond the surgeon's control, and will prove fatal.

HÆMORRHAGE AFTER SURGICAL OPERATIONS.

Hæmorrhage after extraction of teeth is sometimes troublesome, particularly in feeble patients. It is best treated by careful and forcible plugging with a strip of lint, which is to be thrnst bit by bit into the socket until it projects beyond the neighbouring teeth; the pressure of the opposite jaw, maintained by a bandage under the chin, will then keep it sufficiently tight.

Hæmorrhage from the tonsils may follow either the puncture of an inflamed tonsil, or the removal of one which is chronically enlarged, and the former is naturally the more severe accident. The blood comes only from the branches of artery to the tonsil, and *never* from the internal carotid; and if gargling with iced water fails to arrest the hæmorrhage, the Tinctura Ferri Sesquichloridi, or still better, the solution of the perchloride of iron of the French, may be almost certainly depended upon to effect it. It should be applied by means of a small sponge or piece of lint, which must be held firmly against the bleeding point for some minutes.*

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* Compare two cases of hæmorrhage from the tonsils in 'Medical Times and Gazette,' 24th December, 1859. In one the hæmorrhage was arrested by styptics; in the other the common carotid was tied for a supposed wound of the internal carotid, and the patient subsequently dying of consequent softening of the brain, that vessel was found intact.

Leech-bites give trouble occasionally; and should cold and pressure fail to stop the bleeding, a fine-pointed stick of nitrate of silver may be inserted into each wound. As a last resource, a needle or hare-lip pin may be inserted through the skin so as to transfix the bite, and a twisted suture be placed over it.

Intermediary hæmorrhage is that occurring soon after an operation, and before inflammatory action has supervened. Small vessels, which did not bleed at the time of the operation, may begin to do so on the patient's becoming warm in bed, and the bandages, &c., will become more or less stained with blood. This need occasion no alarm unless the blood soaks completely through, and begins to *drip* away from, the dressings, when immediate steps must be taken for its arrest. In the case of a stump after amputation, for instance, the soaked dressings should be removed, and the stump raised and exposed to a current of cold air, while gentle pressure is made upon the main artery with the finger or a tourniquet. If these measures arrest the bleeding, fresh cold dressings may be applied; but the limb had better be elevated, and the pressure gently maintained for a few hours, to avoid its recurrence. If this treatment does not succeed, the sutures must necessarily be divided, and the surfaces of the wound separated, in order that a ligature may be applied to the bleeding point; or if, from any reason, that is impracticable, a fine-pointed actual cautery may be had recourse to as a last resource. In the practice of those surgeons who leave the flaps of amputations apart for a few hours, intermediary hæmorrhage is much less likely to occur; should there be any oozing however, care must be taken to remove with a soft sponge any clot which may have formed, and which would prevent the immediate cohesion of the flaps which it is desired to obtain. Intermediary hæmorrhage after other operations is often more troublesome to treat than after amputation; for example, in resection of the knee-joint, an oozing may take place, but as no large vessel has been divided, and perfect rest is essential for the success of the operation, a house-surgeon should avoid opening up the wound and displacing the bones to look for a small vessel, which pressure and time would probably treat more satisfactorily. The same may be said of compound fractures, &c.

Hæmorrhage after incisions into inflamed parts.—Incisions will often bleed profusely after a warm poultice is applied, as is the general custom in cases of erysipelas, carbuncle, &c., and the patient may lose more blood than is either necessary or advisable. The warm poultice must be immediately taken off and the clotted blood removed, after which strips of lint should be laid in each incision, so as to fill it to the surface, and a pad of lint be placed over all; a bandage should then be lightly applied, and the limb, if possible, kept in an elevated posture. In three or four hours the bandage and pad may be safely removed, and the poultice re-applied *over* the strips of lint, which should be allowed to remain undisturbed until loosened by suppuration.

Secondary hæmorrhage may occur in any wound when a ligature comes away, from the vessel not having become occluded, or it may result from sloughing having opened up vessels not previously implicated. Another and more formidable variety is where ligature of an arterial trunk has been performed, and hæmorrhage occurs at the time when, or soon after, the ligature comes away. Immediate arrest of the hæmorrhage by pressure upon the main artery is of course the first object, and then, should the surfaces of the wound or stump be only partially united, an effort may be made to place a ligature upon the bleeding vessel; when, however, as is often the case, the greater part of the wound has healed, the assistance of the visiting surgeon should be at once obtained, since it will be a question whether the adhesions should be divided and the wound re-opened, or a ligature placed upon the main artery higher up in the limb. Even in cases when the vessel can be reached, it is often impossible to isolate it from the surrounding tissues, and the only method of proceeding then is to carry a thread as close around the vessel as may be, by means of a sharp-pointed aneurism needle, and to tie it and the surrounding structures *en masse.*

In secondary hæmorrhage after ligature of an arterial trunk, two tourniquets will probably be required, one above, the other below the bleeding point, since the already re-established circulation will bring a full current of blood to the lower end of the vessel. Here one of two operations will be required—either to dissect out and tie the vessel at the bleeding point or immediately above, or to place a fresh ligature on the main trunk nearer the heart, and the assistance of the superior officer must be immediately obtained.*

In all cases in which secondary hæmorrhage may possibly occur, it is a useful precaution to mark with ink the spot where pressure should be applied; and both the nurse and the patient should be shown how to make pressure with the finger in case of any sudden emergency. When there is any real probability of hæmorrhage occurring, a tourniquet should be kept constantly but loosely applied to the limb, so that it may be put in action at a moment's notice.

Hæmorrhage after lithotomy may be both intermediary and secondary. There is often a little oozing of blood after the patient is put to bed, which may be checked by bringing the thighs together with a turn of bandage, but occasionally there is a sharp flow of arterial blood a few hours after the operation, sufficient to blanch the patient if he is very young. If the bleeding vessel can be seen, it should be tied or twisted; but if not, cold water may be injected *per urethram* and allowed to run through the wound, and ice can be placed in the rectum. Should these measures fail, recourse may be had to plugging the wound with lint around a tube or catheter, passed through it into the bladder. Secondary hæmorrhage occurring a week or ten days after the operation will require the same treatment.

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* Consult Fergusson's 'Practical Surgery,' p. 418; and see case of secondary hæmorrhage after ligature of both femorals, 'Lancet,' 6th June, 1857.

APPLIANCES FOR ARRESTING HÆMORRHAGE.

Pressure with the finger, if applied on the proper spot, is always sufficient to stop the current of blood in an artery. If possible, pressure should be made against a bone, and not against muscles, which offer but slight resistance; thus the *femoral* artery should be compressed upon the edge of the pubes, and the *brachial* against the humerus. The *subclavian* can be compressed above the clavicle against the first rib with the thumb, or what is better, the handle of a door-key wrapped in lint.

Tourniquets are of several kinds. The ordinary one or Petit's is the least likely to slip, but has the disadvantage of impeding the venous circulation, and is therefore inapplicable for lengthened use. The pad placed upon the strap of this instrument is generally too small, and had better be removed, its place being supplied by a small roller about an inch and a half wide, which should be placed under the strap of the instrument, and over the artery. It will be found most convenient to place the screw of the instrument on the outer side of the limb, except in the case of the popliteal artery, where it should be placed directly over the knee. The buckle of the strap often gets drawn up close to the brass-work, and would impede the action of the screw; care should therefore be taken that a few inches of strap intervene, before the instrument is applied. It will be found impossible to apply this instrument so high upon the femoral artery as either the finger or other forms of tourniquet; neither is it applicable to limbs which have two main arteries.

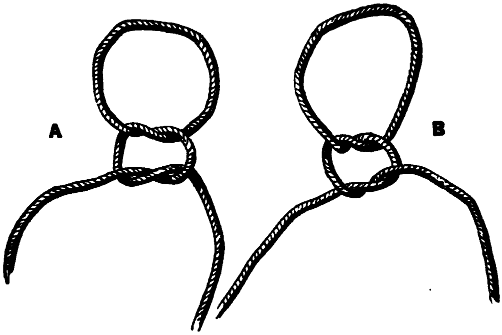
Signoroni's torniquet is chiefly applicable to the upper part of the femoral artery, the hollow pad being applied to the outer and back part of the limb, and the convex one screwed down upon the vessel. This is a very effective instrument in this position, provided the bed-clothes are prevented from touching it; but in other positions it will be found difficult of application, and very liable to slip off.

There are two or three varieties of field-tourniquet, consisting essentially of a strap, buckle, and pad, which can be readily applied; or in case of sudden emergency, a tourniquet may be improvised out of a handkerchief tied firmly round the limb, and a stick twisted in it to keep up pressure.

Forceps are the best instruments for seizing a bleeding vessel, and of all the varieties which have been invented, a pair of ordinary dissecting forceps, broad and well serrated at the extremities, is the best. The spring of the forceps should not be too feeble, since it materially assists in catching a bleeding vessel to have a slight resistance in the instrument. Catch-forceps may be useful where there is no assistant, but it will be very seldom that there is not a bystander who can be trusted to hold the forceps after the vessel is seized, while the surgeon applies a ligature.

The Ligature should be of hemp or silk, of which the former is preferable, and a little study of the best and most rapid way of tying a ligature will amply repay the house-surgeon. The object is to tie a "reef-knot," which is certain to hold, and not what is nautically termed a "granny," which is very likely to slip. The difference between the two knots will be best appreciated by the following diagrams (fig. 1), where the reef-knot is marked A, and the granny B.

Fig. 1.



It will be observed that in the 'reef' both the ends of the threads come either over or under the corresponding loop, while in the 'granny' one thread is over and the other under; the result of which is that the loops are not so flat, and when pulled tight do not come so closely together, or hold so firmly, as in the true 'reef-knot.' Any one can satisfy himself of this in a moment by tying the two knots on a piece of string and comparing them. The secret of invariably tying a reef-knot is to make the same thread uppermost or undermost both in the first and the second tying. This can be, and is, accomplished by most surgeons by changing hands after the first tying, which always looks awkward and wastes times. A much better method, but one which requires a little practice to learn thoroughly, is the following:—The ligature (which should be sixteen inches long) is to be held in the palm of the (right) hand between the thumb and forefinger, the end is then to be thrown round the forceps closely and caught with the left hand: the right hand is now brought under the end in the left, when that end is to be crossed over the right thumb and inserted between the third and fourth finger of the right hand (fig. 2); the left hand at the same moment seizes the other end, and thus an interchange is effected and the ends of the threads are drawn out as is being done in fig. 3. There will now be no difficulty in drawing the knot thus formed tight with the fore fingers, or if

FIG. 2.

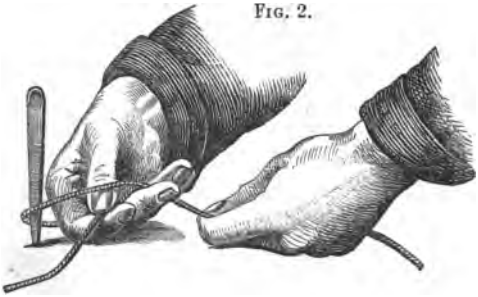
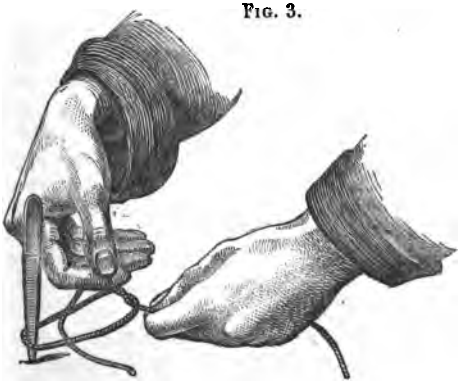
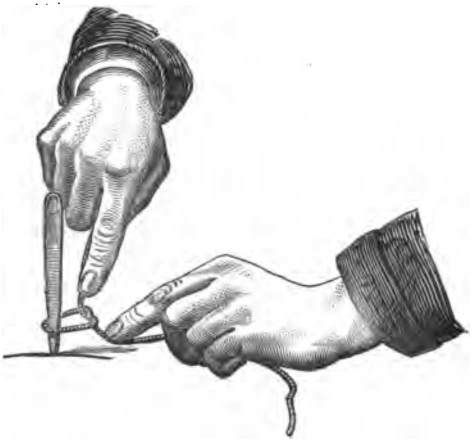


FIG. 3.



preferred with the thumbs (fig. 4). To complete the

FIG. 4.



knot by making another tie, the same manœuvre is to be effected, taking care always to begin with the opposite hand to that which began before. It is quite unimportant which hand begins the first part of the knot, so long as the *opposite* always begins the second part; and in this way, with a little practice, the reef-knot may be unerringly tied with the greatest rapidity. Some people may possibly think that the above directions more resemble those for the performance of a conjuring trick than a surgical operation; but I think it well worth a surgeon's while to attain the greatest possible dexterity in the use of his fingers, both for his own and his patient's sake.

In whatever way the knot is made, great care should be exercised not to tie the forceps in, while drawing it close; to avoid which accident, the best way is to keep the loop flat upon the wounded surface, and as it is drawn tight, to prevent it slipping up with the forefinger on each side. In pulling the ends of the thread, they should be drawn *downwards* as much as possible, *i. e.* towards the wound, since otherwise the ligature may very possibly be pulled off repeatedly. Although the manner in which the ligature is tied is of the greatest importance, still much depends upon the way in which the forceps seize the vessel and hold it afterwards. Except in the case of the large vessels which have a distinct sheath, it is impracticable to attempt to seize merely the bleeding orifice, but a certain amount of surrounding tissue must necessarily be grasped, and tied in by the ligature; and it will much facilitate the operation of tying, if the holder of the forceps draws them slightly away from the side on which the knots are being made, at the time the ligature is being applied. When the tenaculum is used to seize the vessel, the same method of applying the ligature should be employed, but care must be taken to make the knots *beneath* the instrument, and not over it so as to prevent its being withdrawn.

Acupressure, as devised by Professor Simpson, has for its object the arrest of hæmorrhage by means of a needle, which is made to exert pressure upon a bleeding vessel, either by compressing it against a bone or the surrounding tissues. The needle may be applied either on the surface of the wound or at a little distance from it, by transfixing the skin, and wherever it is inserted the extremity must be left at the surface of the body, in order that it may be withdrawn in two or three days, after the vessel has become occluded by natural processes. The advantage of this method is that the irritation caused by a ligature is avoided, the metallic needle producing no such effect, and being withdrawn at so early a date it offers no impediment to the wound's healing by first intention. At present surgeons have had but little experience in its use, but it seems possible that acupressure may be substituted in some cases for the ligature, and especially in the amputations, in which it is most easily applied.

CHAPTER II.

WOUNDS, CONTUSIONS, BURNS, ETC.

WOUNDS present an endless variety both of shape and position. The treatment of some of these has necessarily been included in the observations upon hæmorrhage, which is one of their constant accompaniments. Respecting wounds generally, it will be sufficient to say that the surgeon's object is to heal them by first intention, if possible, and that this result may be ordinarily looked for in the case of clean incised wounds, whilst it is least likely to occur in crushed or torn tissues. Dry dressings, with moderate pressure and support, have a direct tendency to aid the process of rapid healing, and they form therefore the appropriate treatment of incised wounds. Should any dirt or foreign body have entered the wound, it must be carefully removed with a sponge and cold water; but if there is no reason to imagine such an event to have occurred, it is cruel and unnecessary to insist upon probing a wound simply to satisfy a morbid curiosity as to its depth, with the possibility of exciting anew the hæmorrhage, which has been arrested by natural processes. A small pad of lint will probably be sufficient to keep the edges of the wound in apposition beneath a carefully applied bandage; but if not, a pad may be placed on each side of the incision so as to exert pressure on the deeper parts, the surface being covered with a small additional piece.

Strips of adhesive plaister may be applied to hold the edges together, but in that case they should be cut long enough to take a hold upon the skin some inches beyond the actual wound. In the case of the extremities, it may sometimes be advisable to carry a long strip of plaister round the limb, making the ends cross over the wound, in order to exert pressure upon the tissues.

Sutures are requisite in very large wounds, and in cases where the skin retracts so that without them the cut surfaces do not come into apposition; they should be of silk or wire, which latter excites little or no irritation in the tissues, and can therefore offer no impediment to union by first intention.

Contused and lacerated wounds, particularly those in which a large portion of skin has been destroyed, can only be expected to heal by granulation, and they may therefore be appropriately treated from the first with "water-dressing." It is in these wounds that foreign bodies may generally be expected, and care should therefore be taken to cleanse them as far as can be readily effected; but any little remainder of dirt, &c., will be certainly thrown off by the process of suppuration. Strapping, and careful but light bandaging, are very serviceable in these injuries; but sutures are of little use unless the wound is very extensive. In fact, the house-surgeon will have to guard against allowing a wound to heal at the surface while suppuration is going on in the deeper parts.

The after-treatment of wounds consists mainly in attention to three points, viz., rest, cleanliness, and temperate living. The first must be attained by confinement to bed in severe cases, or at least cessation from employment, and if necessary the use of a sling, &c.; the second is for the house-surgeon to see to at each dressing of the wound; while the third can generally only be hoped for in patients under the surgeon's eye in the wards of an hospital.

Cases in which union by first intention is hoped for, should not have the first dressings disturbed before the third or fourth day, provided there is no pain or throbbing complained of, and the dressing should soaked off with tepid water, to avoid tearing open the edges of the wound. Should the edges be found united throughout, and no swelling or redness indicate the presence of pent-up matter, a piece of dry lint and a bandage should be again applied, to give support, and in a few days a perfect cure will be effected. It not unfrequently happens, however, that pain and throbbing indicate the presence of pent-up fluid, and it is surprising how much inconvenience a mere bead of matter will occasion. In such a case it is unnecessary to tear open the whole of the wound; for if with a probe a small opening be made at one end of it, a little pressure will cause the fluid to exude, to the patient's immediate relief, and the lint and bandage can then be re-adapted. Supposing the effort to induce healing by first intention to fail, the wound will become converted into a granulating one, and be treated accordingly. Granulating wounds are best treated with water-dressing, some stimulating lotion being used in addition, when necessary. When there are sloughs to come away, linseed-meal poultices may be advisable for a time, but should not be prolonged so as to make the granulations weak and flabby. In dressing a granulating sore, care should be taken to cut a piece of lint just the size of the wound; over that should be placed a piece half an inch larger in each direction, and on that again the oil-skin or thin gutta-percha, which should again slightly overlap it, the whole being retained by strips of plaister or a light bandage. Although cleanliness, as regards the dressings, &c., is of the greatest moment, the surface of the sore should not be interfered with more than to sponge off, gently, any superfluous matter, for a certain amount of pus is absolutely necessary for its progress.

Wound of the cornea is too frequently accompanied by prolapse of the iris. If seen immediately after the accident, an attempt may be made to restore the iris by dilating the pupil with the solution of sulphate of atropine (gr. ij ad ℥j), a few drops being placed in the eye, and some smeared around the orbit. A strip of plaister should be placed over the lids, so as to keep them closed; and the patient should wear a shade over both eyes, and entirely abstain from using them. If there is pain, iced water applied on lint over the eyes will relieve it. It is seldom that a case is seen so instantaneously as to be benefited by the treatment with belladonna, and the small prolapsus will soon shrink up, and can be clipped off in a few days with a sharp pair of scissors.

Wounds over the shin often give trouble, if neglected. Collodion and absolute rest form the best treatment; and as they are frequently accompanied by a bruise of the surrounding parts, the tincture of *Arnica Montana* may be usefully painted around, but not upon, the wound.

Wounds of joints.—Wounds of joints, if not obvious at first, are soon made evident by the escape of synovial fluid, which trickles out, and can easily be distinguished from blood by its light colour and tenacity. Closure of the wound is of the first importance, provided no foreign body is left in the synovial cavity. In the case of punctures or small incisions, collodion forms the best application, the same precautions being used as in cuts on the face. (See p. 14.) In the absence of collodion, white of egg is not a bad application; and plaister should be used to support the parts, and prevent the wound being dragged open. When the wound is so large as to require the application of stitches, care should be taken not to insert them through the synovial membrane, and collodion may be advantageously applied over them. Perfect rest and the application of cold are the best preservatives against inflammation of the joint; and a splint should therefore be applied to the limb, which must be kept, if possible, in an elevated position. The posture which is easiest, and which relaxes all the parts most, must be the best at first; but, should inflammation come on, care must be taken to place the limb in a position in which it may ultimately be useful, should the motion in the joint be lost or impaired. Irrigation with cold water is the readiest and most certain method of applying cold to a wounded joint.

Bruises and contusions form a considerable portion of out-patient practice. They present every possible variety, and it is generally from fear of some more severe lesion having occurred, rather than for the treatment of the bruise itself, that the patient applies to the house-surgeon. A careful examination is essential in all cases of contusion, lest some injury should be overlooked; and when, as sometimes will occur, it is found impossible, owing to the swelling, to arrive at a definite conclusion, it is better to err on the safe side, and treat the case for the more severe injury (*e. g.* fracture), than to commit an error which may be of lasting importance to the patient, by ignoring the possibility of its occurrence.

Cold is the best application for a bruise, and this may be applied in any way most convenient—by irrigation, the application of a wet bandage, or the use of an evaporating lotion. The following is a useful formula for an evaporating lotion:

℞ Spiritus Vini rectificati,
Liquoris Ammoniæ Acetatis, āā fʒj;
Mist. Camphoræ, fʒxiv. Misce;

and care should be taken to instruct the patient to allow it to *evaporate*, and not to cover the rag on which it is applied. The tincture of Arnica (from ʒiv to ʒvj to the pint of water, or stronger) has been highly recommended in all cases of bruise, and appears to have considerable power both in alleviating pain and procuring absorption of the effused blood.*

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* Vide Lecture by Mr. Mitchell Henry, 'Lancet,' 10th December, 1859.

There is one form of bruise which requires special notice, and that is, where a circumscribed swelling is produced on the head by a blow, which gives an appearance resembling depressed fracture of the skull, owing to the circumferential swelling of the integuments. Since this affection is frequently conjoined with cerebral symptoms—concussion, or compression —it becomes of importance to make a correct diagnosis; and careful manipulation will generally prove that the appearance of depression is deceptive, while the presence of fluctuation in the centre will, in many cases, assist in arriving at the truth. A bladder of ice to the head is the best treatment. In large subcutaneous effusions of blood in a limb it may be occasionally advisable to tap the swelling with a fine trochar, and draw off the uncoagulated blood; but this should never be done in a recent case, as it will only lead to further effusion from the ruptured capillaries.

Contusions are best treated by rest and opiate applications. Bed is the great panacea; but if this is not attainable, rest of the limb, by means of a sling or otherwise, should be enjoined. In contusions of the chest, even where there is no suspicion of a broken rib, a broad flannel bandage, firmly applied, gives great relief, by restraining the intercostal muscles; and on the same principle a bandage may be applied to a limb. Soap liniment, with a little laudanum in it, is a good application in most cases; the fact being that it is perhaps the friction which does as much good as any medicated application.

Where a patient is shaken and bruised all over by a fall from a horse, &c., a warm bath gives great relief, provided he is not faint.

In any case of contusion about the abdomen, and particularly if the injury has been inflicted by a carriage-wheel, the house-surgeon should immediately pass a catheter, which must be retained if there are symptoms of injury to that viscus or to the urethra, such as bloody urine, or pain over the pubes. The early attendance of the surgeon should be requested to any case in which rupture of the bladder may be suspected, and care should be taken in these cases not to overlook a fracture of the pelvis without displacement.

Sprains, though apparently trivial, should never be neglected, since they too frequently lead to joint-disease. Although, in most cases, it is only the ligamentous tissues which suffer, yet occasionally small prominences of bone are wrenched off, or, in youth, the epiphyses may be torn away. In all cases of sprain, therefore, a thorough but gentle examination of the joint should be made, and if this is impossible from the pain produced, chloroform should be had recourse to, rather than that an error in diagnosis should be committed. Unless seen immediately, the swelling is often so great as to mask the nature of the case, and no opinion should be pronounced until a thorough examination can be made.

The local abstraction of blood by leeches is of great benefit in violent sprains, and the bleeding may be encouraged by hot baths or the application of linseed poultices. Subsequently, support of the affected joint is of the greatest importance, and this may be effected by careful bandaging, or, still better, by strapping with adhesive plaister, which has the advantage, not only of supporting, but of rendering the joint motionless, much more effectually than the bandage. Strapping may, in most cases, be applied within thirty-six hours of the injury, and thus the patient will be enabled to get about with comparative comfort.* Stimulating frictions are useful in the later stages.

Strains generally mean some rupture of muscular or tendinous fibres, although sometimes the term is vulgarly applied to a hernia. Time is the only cure for ruptured tissues, and all the aid the surgeon can give is to approximate the extremities of the torn fibres, so that they unite as rapidly as possible, and also that no subsequent weakness may result from the tissues being lengthened. Cold applications will be useful in relieving the pain, and will assist in inducing the absorption of any effused blood.

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* Vide 'Hood, on Sprained Ankle.'

Ruptured tendo Achillis may be conveniently mentioned here. It generally results from some unwonted exercise on the part of an elderly person, who drops suddenly to the ground. A snap is sometimes heard, and the rupture can be felt with the finger. The treatment consists in attaching a strap to the heel of a slipper, and fastening it above the knee, so as to point the toe thoroughly, and slightly flex the knee. Ruptures of the fibres of the muscles of the calf may be treated in the same manner.

Machinery accidents present every variety, from simple fractures or incised wounds, to total disorganization of a limb. The hæmorrhage, if any, should be arrested, and the parts be brought as nearly as possible into their normal relations to one another, stitches being inserted when necessary, and even where there is no fracture, the application of a splint to a crushed limb will often be of the greatest service. Amputation should not be thought of while there is any hope of saving a limb, since it is extraordinary how well severe machinery accidents turn out, owing to the previous good health of the patients. When a portion of a limb has been torn off, amputation higher up will probably be necessary in order to obtain sufficient soft tissue to form a stump; but for this the advice of the visiting surgeon should always be obtained.

Extraordinary scalp wounds are sometimes produced by the long hair of women becoming entangled in machinery, and the scalp being consequently torn off the head, partially or completely. If only partially removed, the scalp should be carefully sponged and replaced, if possible, without the use of stitches, and with dry dressings. The "capeline" bandage (fig. 33) will be found a very useful application in these cases, and will often ensure a healing by first intention. When the whole scalp has been torn off, water dressing forms the best application, and the surface will proceed to granulate, provided the patient's strength is sufficient to bear up against the shock and exhaustion.

The house-surgeon may be summoned to a manufactory to "cut out" a sufferer from machinery, which it is found impossible to remove without doing further damage. No precise rules can be laid down for such proceedings, but the chief points are, to guard against hæmorrhage, and to remove as little of the body as possible; but the amputation should be done so as to avoid a second operation.

When a limb, and particularly the arm and hand, has been crushed by machinery, and it is resolved to give it a chance of recovery, a most excellent mode of treatment will be found in irrigation with tepid water. The constant flow of water keeps the complicated wound thoroughly clean, modifies the inflammation, and has a direct tendency to effect a cure. Poultices may be advisable for a short time, to favour the separation of sloughs; but, if employed, care must be taken that the matter has a free discharge, or pyæmia will very possibly result. When granulation has commenced, the ordinary treatment of wounds is all that is required, viz., cleanliness, support, and slightly stimulating lotions, together with proper attention to the patient's general health.

Burns and scalds.—In superficial burns, *i. e.*, where only the cuticle is destroyed, and in scalds, the readiest application is a mixture of collodion and castor oil (two parts to one), which should be painted with a small brush all over the injured surface; or the gutta-percha collodion may be used pure. When vesicles have been produced, they should be snipped with a sharp pair of scissors, the serum being gently evacuated with a piece of cotton wool, and the collodion mixture applied over them. This mixture may be conveniently kept ready made in a well-stoppered (or better, a capped) bottle, in the surgery, and its application, although painful for the moment, will be found to give immediate relief to the smart of the injury. No other dressing should be put over the collodion, which should be repeated once or twice as it dries. If the injury is quite superficial, the skin will probably cicatrize before the collodion scab drops off; but if too severe for that, healthy granulations will spring up, which are best treated with water dressings.* Cotton wool (or what is better and cheaper, the common white cotton wadding, split open) is a favorite and useful application both for burns and scalds. It should be carefully wrapped around the injured part, and maintained in position by bandages. It certainly soothes the pain rapidly, but has the disadvantage of sticking to the raw surface, from which it should be allowed to separate by suppuration, assisted by a poultice, if necessary.

Carron oil (equal parts of lime-water and linseed-oil) is an exceedingly nasty application, though a favorite with many surgeons. Lint soaked in it is placed over the burnt part, and in badly charred cases it is perhaps as good an application as any, though its offensive odour is a great drawback. In burns of the face a mask of lint dipped in carron oil is sometimes used; but the collodion and oil is an equally efficacious application, and much pleasanter for the patient. At the London Hospital, where the cases of burns are very numerous, the universal treatment is the application of zinc ointment on lint, fomentations being applied over the dressings for the first few hours.

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* W. P. Swain, 'British Med. Journal,' December 27, 1857.

The after-treatment of burns, both locally and constitutionally, is of the greatest importance. If the injury is at all severe, immediately after the first dressing the patient should be put to bed; and if the shock of the injury be great, some stimulant, such as hot wine and water, should be administered, according to the gravity of the symptoms and age of the patient. Hot bottles to the feet will occasionally be of great assistance in helping to restore the vital powers. Some form of sedative, even in young children, will be advisable, both to relieve pain and procure sleep, and this may be necessary for some days after the accident. Subsequently, ample nourishment, and probably stimulants, will be necessary to counterbalance the drain upon the system caused by the profuse suppuration. As respects the wound itself, our object is to get it into a state of healthy granulation as quickly as possible, and for this purpose—so soon as the first applications are removed—water-dressing may be applied, with or without myrrh or some other lotion; or the zinc ointment may be used, if preferred. A poultice can only be useful in expediting the detachment of eschars, and should not be employed afterwards, as it will only provoke suppuration.

To prevent contraction during and after the cicatrization of burns is one of the house-surgeon's most difficult tasks, and will tax his ingenuity to the utmost. Extension of the cicatrix must be constantly kept up by the use of splints if the injury is on the limbs, or by laying the patient flat in bed, or even with the head overhanging the bed, if the burn is on the neck. Of the various apparatuses which have been contrived for stretching the cicatrices of the neck, the only one which I believe to be effectual is that which exerts pressure in both directions, and pulls the skin down over the clavicles by means of a collar, at the same time that the chin is raised. Those screws which only get their purchase from a waistband, and therefore only act in one direction, are worse than useless.

Bad burns are often months in an hospital, and as they are by no means favorite cases with either dressers or nurses, it behoves the house-surgeon to exercise a sharp surveillance, and to see that they are properly attended to, or he will find that with all his care the patient will become crippled by contractions.

Scalds of the glottis require special notice and treatment. The patient is generally a child who has attempted to drink boiling water from the spout of the tea-kettle, and has consequently injured the mouth, fauces, and upper part of larynx, more or less severely. The symptoms of dyspnœa will vary according to the time which has elapsed since the accident, and the amount of damage done. If the little patient is evidently *in articulo* from want of breath, the house-surgeon had better perform tracheotomy at once; but if the symptoms are not of such extreme urgency, the operation should be deferred, for a time at least, in order to try the effects of treatment. The first thing is to place the patient in a warm and moist atmosphere, and this can be contrived by placing an ordinary surgical cradle over him, and under the bed-clothes or a piece of Macintosh cloth, and then bringing the steam of a kettle beneath the canopy thus formed. Care must of course be taken that the temperature be not raised above 80°, or the patient will be suffocated and parboiled. Relief may also be attempted by scarifying the back of the throat, epiglottis, &c., which has been known to be of great service in some cases.

As regards medicines, antimony and ipecacuanha appear to offer the best chance of success, and they may be most conveniently administered in the form of the wines. Large doses of either (and antimony by preference), according to the child's age, may be given, and frequently repeated, until the breathing is relieved. Vomiting is not to be wished for, and will seldom be produced. Mercury may be combined with the antimony, and to be of any service must be administered in heroic doses and frequently; but should the breathing become more embarrassed, the operation of tracheotomy must at once be had recourse to.*

Injuries from firearms and gunpowder.—Gunpowder will inflict damage according to the mode in which it is exploded, rather than the actual quantity ignited. Loose powder scorches and burns the surface of the body severely, and, from the mode in which it 'flares up,' is very apt to injure the eyes and burn the hair off the head. The treatment of such injuries differs in no essential particulars from that of burns generally. Compressed powder shatters and destroys by the force of the explosion, in addition to the damage done by the flame. A firework exploding in the hand, the bursting of a gun, or still more commonly of a powder-flask held over a light, will shatter the hand very severely. On admission to the hospital, the hæmorrhage, if still existing, should be arrested by ligature or otherwise, and the state of the hand be carefully examined. In the case of children or adults without much self-control, it may be advisable to administer chloroform at once, and do what is necessary while the patient is under the influence of the anæsthetic. If fingers are blown off, the adjacent tissues should be drawn together as far as may be, to form a stump, or it may be well, particularly in the case of patients of the better class, to remove at once the head of the metacarpal bone, so as to improve the after-appearance of the hand. Although severely torn and even fractured, a finger should never be hastily amputated, since with careful dressing and support on a splint apparently desperate cases do well eventually. If only *one* finger can be preserved it should be saved, and what is said of a finger applies with double force to the thumb, without which the hand loses the greater part of its powers, and presents a most unsightly appearance.

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* Compare Cooper Foster, on 'Surgical Diseases of Children,' and Dr. Bevan, 'Dublin Quart. Journal,' Feb., 1860.

Gunshot injuries may be immediately fatal from hæmorrhage, or from injury inflicted on a vital part. A bullet and a charge of shot at a short distance will each produce a single wound, the edges of which are inverted; whereas if the missile emerges from the body, the edges of the last opening are, as a rule, everted. A charge of shot from a distance is so much scattered as to do little more than 'pepper' the patient, the pellets lodging in the skin, from which they are readily extracted; but if fired pretty close, the charge does more harm than a bullet, tearing the soft tissues and spreading through them so as to render extraction of the shot impossible.

The primary treatment of gunshot wounds does not differ in any way from that of wounds generally; but as in the after-treatment, the extraction of the ball, &c., many important questions become involved, it will be well for the house-surgeon to obtain the advice of the visiting surgeon at an early date, more particularly since gunshot injuries almost always lead to legal inquiries in some form or other.

The treatment of wound of the lung by firearms is the same as in the case of stabs. (See p. 18.)

Bites of animals and stings.—The dog is the animal whose bite is most commonly met with, though occasionally the cat, rat, or horse inflict injury in this way. The fear of hydrophobia is always present in the mind of a patient who has been bitten, and the house-surgeon should not lose sight of the danger, although the frequency of its occurrence is greatly exaggerated.

When, as often happens, the dog has merely snapped, and perhaps grazed or only marked the skin, no treatment is really required, though it may be advisable to give the patient some evaporating lotion as a *placebo,* together with a few words of assurance as to his safety. Where a wound is actually inflicted, if recent, it may be cauterized with nitrate of silver; or, if there are really any suspicions as to the state of the animal, it will be only safe to give the patient chloroform and excise the edges of the wound, taking care to go quite to the bottom, or where this is impossible, the actual cautery will form an efficient substitute. Both patient and animal should be kept under surveillance for some weeks, if possible, in order that any symptoms may be treated as early as possible. The bite of a cat is even more dangerous than that of a dog; but that of the horse is only important on account of the severe local injury generally inflicted when this animal indulges his biting propensities.

The sting of the adder is the only common accident of the kind met with in this country. The treatment consists in the extraction of the poison by sucking the wound, or applying cupping-glasses, after which a poultice is the best application. The vital powers are severely and rapidly depressed by the absorption of the poison, and must be supported by the free administration of ammonia, ether, brandy, &c. In the rare cases in this country of bites by tropical serpents, the rapid administration of diffusible stimulants and the use of artificial respiration form the appropriate treatment.

Suspended animation (hanging, drowning, &c.).—Drowning is the most common cause of suspended animation, though cases of hanging and suffocation from noxious gases occasionally occur. In all cases the object is the same, viz., to restore the action of the heart, which may be most readily accomplished by resorting to artificial respiration, combined with frictions to the trunk and extremities. The Marshall Hall method of artificial respiration, as it is called, is that commonly put in practice, and consists in laying the patient on his face with the right arm doubled under the forehead, so as to prevent obstruction of the mouth, which should be seen to be open. The assistants, grasping the left shoulder and hip, should then turn the patient on his side, and half-way on to his back, when the motion is to be reversed, and the patient placed again in the prone position. This series of manœuvres should be repeated from sixteen to twenty times a minute, and the difficulty in practice is, to prevent the too rapid movements of over-zealous assistants. Another mode (Dr. Sylvester's) is to lay the patient on his back, and having pulled the tongue forward, to draw the arms slowly up over the head, by which means the ribs are elevated by the pectoral muscles, and inspiration is produced; the arms are then to be brought down to the side of the chest, which they are to compress in a slight degree. These movements are to be repeated as slowly as in the other method, and it is said that they give a more complete charge of air to the lungs.

Whichever method is preferred should be put in force without a moment's delay, and be persevered in without intermission for not less than half an hour. Frictions with warm towels may be had recourse to in addition, the direction of the rubbing being as far as possible *towards* the heart.

The galvanic battery, or the more convenient electro-magnetic machine, may be had recourse to in desperate cases, but is rarely of much service. The poles may be applied over the base and apex of the heart, or over the diaphragm; but the artificial respiration must never be relaxed, as upon it the chief reliance is to be placed.

In cases of hanging, and occasionally of drowning, the face is turgid, and the head evidently enormously congested; and under these circumstances it will be justifiable to take blood from the external jugular vein or from the temporal artery.

When symptoms of recovery begin to show themselves, stimulating enemata of wine or brandy may be useful; but the house-surgeon must be careful not to administer stimulants by the mouth until animation is fully restored, lest they pass into the lungs and so suffocate the patient. In cases of apparent death from chloroform, carbonic acid, &c., all the above measures may be adopted; and in addition (particularly in the case of chloroform), dashing with cold water, to produce a forcible inspiration, should be immediately had recourse to.

Concussion and Compression.—When a patient is brought into the hospital in an insensible state, the result of a blow on the head, it becomes of immediate importance to determine the cause of that condition. The house-surgeon should make a careful examination of the head to see if there is any external injury, and institute inquiries as to the nature of the blow and its probable seat. If there is no injury to the head, or at most only a scalp wound, if the patient can be partially roused by bawling at him, and if his skin is cool, and the pupil contracted, he may pretty safely be considered to be labouring under concussion. If, on the contrary, he is perfectly senseless, if the breathing is laboured and stertorous, and the pupils are unequal or dilated, it may be looked upon as a case of compression. The diagnosis will be confirmed by any severe external damage to the head, and particularly by any fracture or depression of the skull. The pulse will not be of much service as a diagnostic aid *immediately* after the accident, but in a few hours will vary materially in the two affections, in concussion being feeble and irregular, in compression becoming full and slow. It must be carefully borne in mind, that cases of apparently simple concussion may become converted, in a few hours, into cases of compression the result of intra-cranial hæmorrhage, and this will be generally indicated by the supervention of stertorous breathing.

The primary treatment of both affections is the same, viz., to place the patient in bed, have the head shaved, and ensure perfect quiet by the exclusion of all visitors. In concussion, if the depression of system is not already too great, cold may be applied to the head in the form of evaporating lotions or a bladder of ice; but if very prostrate, these should be omitted, and hot bottles be applied to the feet, and mustard poultices to the calves of the legs. A patient will be for hours in a perfectly tranquil condition, and so long as his pulse keeps steady, and the breathing regular, this need excite no alarm; but should the pulse decline, or symptoms of compression from effused blood come on, the advice of the visiting surgeon must be obtained without delay.

In cases of compression, the visiting surgeon should be immediately summoned, since operative proceedings, to be of any service, must be had recourse to at as early a period as possible, and even should none be advisable, the treatment of these cases requires all the suggestions of long experience.

FOREIGN BODIES.

In eye.—Foreign bodies lodged on the conjunctiva may vary from a small particle of dust to a splash of molten lead sufficient to cover the cornea. Immediate removal is absolutely necessary in all cases, and this is accomplished by everting the lids over a probe, when the foreign body may be removed with a pair of forceps, or brushed out with a camel's-hair pencil. When a particle of metal or some similar foreign body has become imbedded in the cornea, it may be difficult to catch sight of it; and the house-surgeon should place the patient between himself and the light, and look *along* the cornea, when even if the foreign body does not project, he will be able to mark the abrasion of the epithelium, and very probably catch the refracted image of the object. The little 'spud' made for the purpose, or a broad needle, will be required to dig the foreign body out of the cornea, and when this has been accomplished, a drop of castor oil placed between the lids will give immediate relief to the pain. When a particle of metal has been removed, or has possibly worked its way out spontaneously, there will often be left a slight stain, which will not require any special treatment. The magnifying-glass will serve to establish its nature.

In many cases, particularly in children, the spasm of the eyelids is so great that it is impossible to examine the eye, much less to remove a foreign body; and it is advisable, therefore, to have recourse to chloroform at once, by which means the difficulty is immediately overcome.

Lime in the eye produces most serious mischief, unless immediately removed. This should be done at once with a *dry* camel's-hair brush, and then the eye should be thoroughly washed with vinegar and water, or very dilute acetic acid, so that any remaining lime may be converted into a harmless salt. It is well to warn the patient and friends that the injury is of a serious nature, so that they may be prepared for the opacities which will probably be left, notwithstanding early treatment.

Foreign body in ear or nose.—Generally a bean, pea, or small stone, pushed in by the child itself, constitutes the obstruction, and can in many cases be removed at once with a pair of small forceps or with the scoop. If the house-surgeon should not succeed at once (and he should be careful not to do any damage by poking about too much), recourse must be had to the syringe and warm water. The syringe should be of good size;

but as the surgeon's object, particularly in the case of the ear, is to expel the foreign body by the *return* current of water, it is important not to use a syringe with so large a nozzle as to plug the meatus; and care should be taken to direct the water down to the membrana tympani, so that the return current may be as forcible as possible. In the case of the nostril, the foreign body may often be conveniently pushed back into the fauces with a probe or small bougie. There is one caution necessary respecting the use of the syringe, which is, that when the foreign body is known to be of a vegetable nature, syringing, if used, must be persisted in until the body is removed at the same sitting, lest, if left to another time, the moisture should cause the body to swell, and so impede its ultimate removal.

Foreign body in larynx produces symptoms of alarming urgency, the patient being often brought to the hospital black in the face and apparently moribund. The house-surgeon should immediately thrust his finger down the throat, in order to feel and displace any body, such as a lump of meat, &c., which may be obstructing the glottis; and if this is not feasible, an opening should be instantly made in the crico-thyroid membrane, so as to admit air to the lungs.

[Laryngotomy is here recommended instead of tracheotomy, because I believe that, in these very urgent cases, the few moments' delay necessary for the performance of the latter operation, and particularly in somewhat inexperienced hands, is of the most vital importance; and besides, these very urgent symptoms are generally found in cases where the foreign body is impacted in the glottis, and has not passed into the trachea at all. Should tracheotomy be subsequently necessary for the extraction of the foreign body, the previous operation will be of no importance, and will offer no impediment to its due performance.]

The urgent symptoms of suffocation having been thus relieved, aided, it may be, by artificial respiration, careful attempts should be made to ascertain the position of the obstruction; and if, as may be expected, it is discovered fixed between the vocal cords, efforts may be made to displace it by inverting the child and slapping its back pretty sharply, or by gently introducing a probe from below. When the foreign body *has* passed into the trachea, inversion of the patient, &c., may be tried, *provided laryngotomy has been performed;* for if this has not been done, the body may get impacted between the vocal cords and necessitate an instant operation. In those cases which are brought to the hospital for various degrees of dyspnœa, the result of a foreign body in the trachea or bronchi, the house-surgeon is not justified in interfering unless there is great urgency, but should summon the assistance of his senior officers, since these cases require often the most dexterous treatment, and throw a heavy responsibility on the operator.

Foreign body in œsophagus.—Large masses of solid food occasionally get fixed in the œsophagus; but most commonly the foreign body is a bone (generally a fish-bone), or in rare instances a set of artificial teeth. If the foreign body is one which can be readily digested, or at least will pass through the intestinal canal without difficulty, the best treatment is to push it down into the stomach with a bougie or stomach-pump tube. When, however, a fish-bone is fixed in the mucous membrane, as can generally be ascertained by the pricking sensation experienced by the patient, an attempt should be made to dislodge it. A long forefinger, thrust well down the throat, may be made to hook up such an obstacle with the nail, supposing it is still in the pharynx; but if lower down, one of the numerous forms of probang must be used for the purpose, or recourse may be had to long curved forceps, which require, however, very careful manipulation. The removal of artificial teeth from the œsophagus is an operation of great nicety, and one which the house-surgeon had better relinquish if he does not succeed at the first trial with the long forceps, lest he do irreparable damage to the gullet, or render the extraction impossible except by œsophagotomy.

Foreign body in urethra.—A piece of a gutta-percha bougie is the most common example of foreign body in the urethra, and the house-surgeon should be very careful, both in examining its position and attempting its removal, not to push it further down the canal. The foreign body can sometimes be expelled by careful manipulation along the urethra, but if this is unsuccessful, attempts may be made to withdraw it with a slender pair of forceps, the finger being kept carefully upon the urethra behind the obstruction, so as to prevent its being carried on into the bladder. Should the house-surgeon not succeed in his attempts, the case should be submitted to the surgeon's opinion without delay.

Foreign bodies in rectum and vagina.—These cases are seldom of recent occurrence, and would not therefore require immediate treatment by the house-surgeon. In any recent instance recourse may be had to suitable forceps; but should they not succeed, the case may be very well put aside until the surgeon's visit.

CHAPTER III.

RETENTION AND EXTRAVASATION OF URINE, HERNIA, ETC.

Retention of urine.—The cases of retention which the house-surgeon is called upon to treat are mostly of the spasmodic class, and result from some recent excess on the part of the patient; occasionally, however, patients apply at an hospital with retention from other causes, viz., permanent stricture, enlarged prostate, or stone in the bladder. Since the lower classes are generally reluctant to ask for assistance which may involve some personal suffering, a patient with retention ordinarily only applies at an hospital when the agony of his distended bladder becomes unbearable, and its immediate relief, therefore, by the catheter is of the first importance. The use of opium and the warm bath, &c., is only so much time wasted if the symptoms can be immediately relieved by the passing of a catheter, although, if this be impossible, they may afterwards be useful assistants in the treatment. Before entering upon any treatment, inquiry should be made of the patient (if sober) as to his ordinary powers of micturition, and the existence or not of a permanent stricture of some standing; but too much faith must not be placed on the statements of patients respecting the size of the stream passed, in which they commonly exaggerate.

Spasmodic retention.—Supposing no stricture to have existed, an attempt may be made to pass Nos. 7 or 8 silver catheter; but even should a stricture be acknowledged, it is better to begin with at least Nos. 4 or 5. Of the positions for passing the catheter, those of standing or of lying down, I much prefer the latter, as giving the surgeon more control over the patient by preventing his drawing back, and also by doing away with that most unnecessary manœuvre, the *tour de maitre*. The practice varies, of course, in different hospitals; but every surgery should be furnished with a couch or table for a patient to recline upon, if desired. A good-sized catheter, having been selected, should be thoroughly warmed, either by friction with a towel or by putting it up the sleeve in contact with the arm, and it should then be well oiled for at least two thirds of its length. Standing on the left hand of his recumbent patient, the surgeon gently stretches the penis with the left hand, while with the right the catheter is inserted. With very slight force, almost by its own weight, the catheter should pass along the canal, the handle being directed along the left groin, but gradually getting into the median line, until an obstruction is met with. Against this, gentle pressure with the end of the catheter should be made for some minutes, when, if the stricture be spasmodic, a gradual yielding will be distinctly felt, and in a few moments more the instrument will probably enter the bladder. This, the best possible result, can only be looked for in uncomplicated cases, where the urethra has been previously healthy. Should there be in addition some degree of permanent stricture, a smaller instrument may be tried, although the very small sizes are unsuited to cases of spasmodic retention, and are apt to cause hæmorrhage and other mischief. Should the house-surgeon not succeed in these first attempts, he must be guided in his further treatment by the condition of his patient. If the distress is not great, and appliances are at hand, a warm bath may be administered, and thirty or forty minims of laudanum given internally, the probability being that, after the patient has been a quarter of an hour in the bath, the urine will pass of its own accord, or that a catheter will then be readily introduced. Should the distress of the patient be urgent, however, it is better to administer chloroform at once, and to use a catheter (Nos. 6 or 7) with the same precautions as are mentioned above, when the instrument will generally be found to pass with facility. Should this fail, there are still the warm bath, laudanum, and fomentations to fall back upon.

Permanent stricture, when giving rise to retention, is much more difficult to treat. Although, according to the patient's account, he has not been able to pass a *stream* for weeks, it is better to commence proceedings with a No. 4 silver catheter. The patient lying down, this should be carefully passed until it meets with an obstruction, when the left hand should be passed along the urethra externally, to feel if there is any corresponding thickening at this point. The obstruction will generally be found in the region of the bulb at the back of the scrotum; and an endeavour should be made to guide the instrument through it, partly with the right, and partly with the left hand. Not succeeding with No. 4, a series of cautious attempts with successively smaller instruments should be made, the left hand still being kept upon the urethra to serve as a guide for the median line, which it is of course most important to maintain, so as to avoid the formation of false passages.

Even if a catheter pass an obstruction at the bulb, it may fail to reach the bladder, and the operator will find that he is unable to depress the end of the instrument. Under these circumstances the left forefinger should be inserted into the rectum, to feel if the catheter has taken the course of the urethra; and if it be felt on one side of the middle line, it should be at once withdrawn from the false passage, and further efforts be made to carry it on in the proper direction, guided by the finger still retained in the bowel. Even when no false passage has been made, an instrument will sometimes meet with an obstruction just at or about the triangular ligament, and the finger in the rectum will be able often to help it over the difficulty. Should the patient be unruly, or unable to bear the pain of these attempts, it will be well to put him under the influence of chloroform, although but little direct effect can be produced upon the stricture by that agent. An elastic catheter will sometimes succeed in getting through a stricture where a metal instrument has failed, when used as follows:—A good curve having been given to it by means of the stilette (which should be retained), it may be passed down to the stricture, and efforts may be made to push it through; if these fail, the stilette alone may then be withdrawn, and the attempt renewed, when the catheter may possibly find its way through a tortuous passage, and enter the bladder. Whatever instrument happens to reach the bladder should be retained and tied in until, at least, the case has been seen by the visiting surgeon; for if withdrawn at once, the retention may again occur, and treatment become necessary, possibly with a less successful result.

When no efforts of the house-surgeon suffice to relieve the bladder, the assistance of the senior officer should be requested without delay; for if the distension be already great, a small further increase may cause the urethra to give way, and produce extravasation, with its unfortunate results. In cases of retention of short duration, where there is little pain, and the surgeon's visit may be soon expected, a dose of opium may be given, and the delay allowed; but bad cases should never be permitted to remain for hours unrelieved.

It is no part of my plan to enter into the question of treatment to be adopted by the visiting surgeon, which will vary according to both the individual surgeon and the nature of the case; but should a house-surgeon be thrown upon his own resources, and be left to treat a case of retention on his own responsibility, I would earnestly recommend him to tap the bladder through the rectum, as being at once the safest operation, and the easiest to perform.

Enlarged prostate gives rise to retention only in old people, and the increase in the size of the gland can be readily detected through the rectum. Since the chief obstruction to the flow of urine is the central projection from the floor of the urethra, it will be necessary to use a prostatic catheter, *i. e.* a large instrument, rather longer than usual, and with a greater curve. Should this not pass readily, a large elastic catheter, without a stilette, may be used, which will be able to dip over the obstacle. It is a great mistake to use small, short instruments in these cases, since they only perforate the prostate, giving rise to hæmorrhage, and never reach the bladder at all.

Paralysis of the bladder from over-distension must not be confounded with retention caused by stricture. The obvious treatment is to relieve the over-distended viscus by means of a large catheter; and if the house-surgeon follow the above rule of always beginning with a good-sized instrument, he can hardly fall into the error of making false passages in a previously healthy urethra. Over-distension of the bladder gives rise also to another symptom, viz., an overflow or involuntary dribbling away of urine; and this must not be confounded with the want of power over the bladder, by which the viscus is always kept empty. The diagnosis is easily made by percussing the region of the bladder, and noticing the extent of dulness; and the rational treatment is to pass a catheter.

Retention from calculus occurs usually only in children, and may often be overcome by making the child lie on its back during micturition; if this does not succeed, a catheter suited to the size of the urethra may be readily introduced. In such cases, an early opportunity should be taken to determine the presence of a stone, in order that appropriate treatment may be undertaken.

Retention in the female occasionally requires the use of the catheter, though, since it is generally an hysterical symptom, the use of instruments, &c., should be avoided as much as possible. The patient should never be exposed for the passage of a catheter, but she should be placed on her back with the knees drawn slightly up. Standing on the right of the patient, the surgeon will next pass the left hand between the thighs, and place the forefinger just at the orifice of the vagina. An elastic catheter can then be readily introduced with the right hand, and being made to glide over the forefinger of the left will almost infallibly enter the urethra, being felt through the wall of the vagina immediately beneath the arch of the pubes as it passes to the bladder. The so-called tubercle at the orifice of the urethra is generally imperceptible, and likely to be confounded with the clitoris; and it is therefore safer to disregard it altogether, and to proceed as suggested above.

Extravasation of urine may occur either from the urethra giving way after prolonged distension of the bladder, or may be caused by the unskilful use of the catheter having made a hole in the urethra. Occasionally the urethra is ruptured by direct violence, such as a fall across a piece of timber, or is torn in cases of injury to the pelvic bones from any crushing force. In any case the result is the same; the urine gets into the areolar tissue of the scrotum and penis, which it distends, and, if unrelieved, will find its way over the pubes, and into the groins of the patient. If seen early, the distension will simulate that of ordinary œdema, but in a very few hours the skin becomes darkened, black sloughs show themselves at various points, and an erythematous blush spreads for some distance towards the abdomen.

The first thing to be done is to get an instrument into the bladder, in order that no more urine may be effused; and the house-surgeon should make careful attempts to introduce a catheter, using both metallic and elastic instruments for that purpose; and he will often be able to succeed, even in cases of old stricture, the effect of the effusion being to relax slightly the strictured parts. An instrument, having been introduced, should be tied in, and incisions must then be made into the distended parts to allow of the escape of the urine. These will probably be required in the penis and scrotum in all cases, and in some instances into the perinæum and groin also, the extent of the extravasation varying with the particular part of the urethra injured. Light linseed-meal poultices should then be applied to the pubic region, and frequently changed, while measures should be taken to secure the constant flow of urine through the catheter, either by adapting some form of urinal to it, or by frequently removing the stilette.

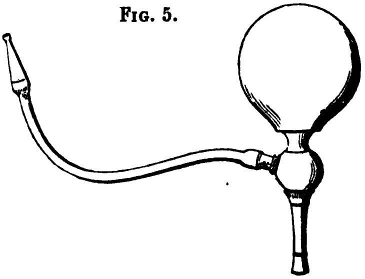
Frequently, however, the house-surgeon will find himself unable to introduce a catheter; and as every hour's delay is of importance, the visiting surgeon should be immediately summoned, when he will either lay the urethra open through the perinæum, and pass a catheter into the bladder, or, what I believe to be safer, will tap the bladder through the rectum, and content himself with making incisions, simply to allow the urine to escape. I would warn the house-surgeon against undertaking the operation of opening the urethra on his own responsibility, since none is more difficult to complete satisfactorily; and the patient being already in a dangerous condition, the possible fatal result may be attributed to his interference.

A patient suffering from extravasation of urine is always in a depressed condition, and will require very careful after-treatment, with plenty of nourishment and some stimulants, at all events at first.

Since false passages are occasionally made by the best surgeons, extravasation may occur in a patient already in the hospital and under treatment for stricture, and the house-surgeon should not mistake the erythematous blush and slight œdema which mark the accident for an attack of erysipelas. The same remark applies to extravasation in children, caused by impaction of a stone in the urethra.

Washing out the bladder is an operation generally intrusted to the house-surgeon, and its careful performance is a matter of great importance, both in cases of diseased bladder and in cases of paralysis the result of injury to the spine, or from other causes. When it is simply desired to wash out any accumulation of mucus or sediment from the bladder, a good-sized elastic catheter, with a large eye, is the best instrument; or when any particles of earthy deposit may be expected, the very large-eyed catheter used after lithotrity will be of advantage. The catheter having been introduced with the greatest care (and more particularly so in cases of paralysis, where sensation is wanting), the bladder should be thoroughly emptied, pressure with the hand being made over the pubes, if necessary, to assist the expulsion of the contents. In doing this with an elastic catheter, it is well to bear in mind that the wall of the bladder, as it contracts, is apt to press against the eye of the instrument, and obstruct the flow of urine, and that this is easily remedied by drawing the instrument out for an inch or so, when the event happens. The simplest, and therefore best, injecting apparatus is a small india-rubber ball, with nozzle and pipe, and bullet valves (fig. 5). The ivory nozzle at the end of the india-rubber pipe may be either inserted into the catheter,

FIG. 5.



or, the nozzle having been removed, the pipe itself may be fitted over the end of the instrument, if the size will allow it. The only precaution necessary to observe in employing this little apparatus is to keep it *upright* when in use, since that position alone enables the bullet-valves to act properly. A shake will occasionally be requisite, if the bullet gets fixed for a moment, but the house-surgeon should beware of officious assistants unscrewing the joint and letting the bullet drop out. The bottle should be filled with tepid water, before it is attached to the catheter, so as to avoid the injection of air, and then, by a series of gentle squeezes, as much tepid water as may be desirable can be readily thrown into the bladder. This water should be allowed to run out into a fresh vessel, and the injection may be repeated as often as necessary.

In some cases the use of a double catheter may be desirable; but the same bottle can be used with it, unless the more cumbrous metallic syringe is for any reason preferred. Medicated injections generally require a gilt catheter; but if weak, they will not do any serious damage to the india-rubber bottle, which must of course be carefully washed after being so used.

Washing catheters.—It is very important that catheters, and particularly the smaller sizes, should be carefully cleansed after being used. The house-surgeon should not leave this to a nurse, but should either do it himself, or see that a dresser thoroughly washes each instrument.

The best way is to let the catheter lie for a few seconds in the water, and then to hold it up with the handle or rings downwards, by which means any blood, &c., is at once washed out in the readiest way. This may be repeated once or twice, and then the operator may blow through the instrument into the water, so as to make sure that the eyes are clear. After being dried with a towel, the catheter should again be blown through so as to dry the interior, and the proper stilette be immediately inserted.

The common method of blowing down a catheter *before* washing it out, simply drives any clot of blood, &c., down to the eyes, and makes its extraction nearly impossible.

Paraphimosis.—Boys are sometimes brought to an hospital on account of the foreskin having got behind the glans penis, so that they are unable to return it, and the disorder will be met with in men, as a not uncommon accompaniment of gonorrhœa. If the case is seen early, reduction is readily effected; but if œdema, and even ulceration have supervened, it is by no means an easy task, but one which I believe may be invariably accomplished in the following way. The patient should be placed upon a couch, and the operator, grasping the foreskin with the fingers of both hands (a towel intervening), should squeeze the blood and serum out of it as much as possible. The thumbs are then to be placed against the glans, and made to compress it in the same way, after which endeavours should be made to draw the foreskin forwards, and at the same time to push the glans in with the thumbs. After a few minutes' steady traction the parts will assume their proper position, unless the foreskin has become ulcerated and its surfaces agglutinated together. Water-dressing should afterwards be applied around the penis, which must be supported by a bandage.

Strangulated Hernia.—It is the exception, rather than the rule, for patients to apply at an hospital *ostensibly* for relief of a strangulated hernia. Having, probably, never been warned upon the subject, they regard the rupture as of secondary importance, and apply for relief of the constipation, pain, or sickness, consequent upon strangulation. In all cases, therefore, of pain in the abdomen with constipation, it is well to direct the attention to the possible existence of a rupture, since the patient seldom or never volunteers the information. If there is the slightest suspicion in the house-surgeon's mind, nothing but actual manipulation should satisfy him, since a hernia of small size may exist without the patient's knowledge; or, although he may acknowledge to a rupture on one side, he may ignore one on the other, which may possibly be strangulated.

Herniæ which become strangulated are generally of old standing, which some exertion has increased in size, since which time the patient has been unable to return the bowel; but a hernia may be produced and strangulated at one and the same time by violent exertion, or by some crushing force. Thus, after the peace illuminations of 1856, a woman lost her life from a strangulated femoral hernia, produced and strangulated by the pressure of the crowd, the tumour, which was of small size, being mistaken at first for an enlarged gland.

Having ascertained the existence of a hernial tumour, it will be the duty of the house-surgeon to inquire very particularly as to the probable duration of the strangulation, the symptoms to which it has given rise, and the amount of tenderness present in the part. A very few minutes only need be thus occupied, but the after-treatment will be guided very much by the knowledge thus gained; for, should the hernia be of only recent strangulation, there need be no bar to the careful application of the taxis, but should the strangulation have been allowed to persist for many hours, or even days, and more particularly should the pain which was at first present have ceased altogether, and the patient be passing into a state of collapse, the assistance of one of the senior surgeons had better be summoned at once, lest the house-surgeon have the satisfaction of finding, *post mortem*, that he has ruptured the congested or mortified intestine by his efforts, and returned the fæcal contents into the peritoneal cavity. The amount of manipulation the hernia may possibly have been submitted to before the patient's admission should also be taken into consideration, for if the taxis has been attempted by a medical man recourse had better be had to chloroform at once, but additional caution in manipulating will be necessary, as it is impossible to say what amount of injury the intestine may have already undergone.

Interference on the part of the house-surgeon, then, not being contra-indicated, the patient should be placed upon a bed or table, with the shoulders well raised by pillows; the thigh of the affected side is next to be bent upon the abdomen and towards the opposite side, so as to relax as far as possible all the structures in the neighbourhood of the groin. With the fingers of both hands the house-surgeon should then manipulate the parts about the neck of the sac, where the strangulation will probably exist, and make firm but gentle efforts to return the contents of the sac bit by bit, and not by attempting to push the whole mass back by main force, or by grasping the bulk of the tumour with both palms. A gurgling sound is an indication of success, and should induce the surgeon to continue his manipulations until the whole of the contents is returned; but if, after some minutes' trial, there is no symptom of progress, and more particularly if so much pain is given as to induce the patient to strain and move himself about, *chloroform* should be at once resorted to. The by no means novel method of assisting the reduction of a hernia by holding up the patient's legs, and so making the weight of the intestines drag upon the sac, has been lately under discussion, and may be had recourse to if the patient consents to this rather rude mode of treatment. It has the disadvantage of tightening rather than of relaxing the parts in the groin.

Chloroform to be of any use in a case of strangulated hernia, must be given until total insensibility and complete relaxation of the muscles have been produced. An assistant taking charge of the inhaler, so as to keep the patient under its continuous influence, the house-surgeon should repeat his efforts at returning the intestine; but if success does not follow in a few minutes he should desist, and send for the surgeon under whom the patient is admitted, the patient being allowed to recover from chloroform, and being placed in a warm bed.

In old-standing herniæ it is frequently impossible to empty the sac completely, owing to the quantity of thickened omentum present. This is of no importance so long as the gut is returned entirely, the best criterion of which is, first, the relaxed state of the sac, and secondly the relief from pain experienced by the patient upon recovery from chloroform. The house-surgeon should not suffer himself to feel annoyed if the surgeon, upon his arrival, is able to return the hernia without operating. It is remarkable how slight a change in the parts may influence the feasibility of this proceeding; thus it happened to myself once to have sent for the surgeon, after having unsuccessfully applied the taxis under chloroform to a case of scrotal hernia, but before his arrival I was summoned to the patient's bed to find that the hernia had gone up spontaneously, to his great relief. In any case, as soon as a hernia is returned, a pad and bandage should be carefully applied, so as to prevent its recurrence.

Prolapsus ani.—Children, and occasionally adults, are sometimes brought to the hospital with prolapse of the rectum. In recent cases the part is readily enough returned by the pressure of the fingers, the gut being grasped by the use of a piece of lint, which it will be found advisable to return along with the bowel, and to leave in, as it tends to keep up the prolapse and will be displaced by the passage of fæces. In old cases, where the mucous membrane has been fretted by the clothes, and may perhaps have ulcerated, the part should be well sponged with cold water before the attempt at reduction is made, and should much difficulty be experienced chloroform had better be resorted to at once, so as to relieve the spasmodic contraction of the sphincter. A pad of lint and a T bandage should be applied to prevent the immediate recurrence of the prolapse, and suitable treatment be adopted for its radical cure. Since prolapsus ani is a frequent accompaniment of stone in children, an early opportunity should be taken to ascertain the existence of a calculus in the bladder.

Rape.—Female children are occasionally brought to an hospital by the parents or the police, on the supposition that they have been raped; and since legal inquiries are likely to arise, the house-surgeon must be very circumspect in conducting his investigations. First, he should note the time when the patient is brought to him, and then proceed to examine her. He should notice any external bruises or scratches, and then make a special examination of the genitals. The general appearance of the labia, whether bruised, inflamed, or merely reddened, the condition of the hymen and the state of vagina and perinæum, should be specially investigated, as also whether any discharge is present or not. Where the alleged assault is recent, the microscopic examination of the vaginal mucus should not be neglected. A small quantity should be removed with a pipette (care being taken to wash it thoroughly first) from *within* the hymen, if that membrane is torn, and submitted to the microscope, when spermatozoa may be discovered, and even in motion.

[By this means I was, on one occasion, able to convict a man of rape, the child having been brought to the hospital two hours after the assault.]

When the investigation is already in the hands of the police it is no part of the surgeon's duty to put any questions to the child, but when, as often happens, his *dictum* will determine the parents in their after proceedings, he must necessarily investigate the whole occurrence. Since in by far the greater number of cases the suspicions of the parents have been unnecessarily aroused, the house-surgeon should be careful to hear the mother's account and that of the patient *separately*, and not in each other's hearing. This is more particularly necessary as respects the child, who may have been frightened or over-persuaded into accusing some innocent person of an assault, while the disorder she is suffering from, if any, is simply the result of natural causes. In these, as in all other medico-legal cases, the house-surgeon should immediately make a few notes of the principal features of the case, and particularly of the dates, that he may be able to give evidence at any subsequent trial, if called upon to do so.

CHAPTER IV.

THE IMMEDIATE TREATMENT OF CASES OF POISONING.

Since cases of poisoning not unfrequently come under the care of the house-surgeon, although, strictly speaking, they more properly belong to the medical side of the house, the diagnosis and immediate treatment of the more common forms will be described in the following chapter. The after-treatment of poisoned cases will necessarily become the duty of the visiting medical officer, and will therefore require no further mention here.

Alcoholic poisoning.—In the slighter cases, the diagnosis is readily made from the history of the patient, who has probably been " on the drink" all day, and his semi-conscious, drowsy condition, coupled with the strong odour of spirits exhaled by the breath. But in more severe cases, and when the history is wanting, the diagnosis between drunkenness and apoplexy is both difficult and important. Thus, when a person is found lying incapable in the streets, and is brought to an hospital by the police, it is necessary to decide at once whether it is a case for the station-house or for the wards.

The external appearances of the patient will serve as a guide, in some degree; for if respectably clothed, with no appearance of disorder of dress, &c., but those dependent upon a fall in the street, the probabilities are that it is *not* a case of drunkenness. If in addition there is no trace of alcohol in the breath; if the pupils are unequally contracted or dilated, and the patient cannot be roused in the slightest degree, the diagnosis of apoplexy will be confirmed, and the patient should be at once admitted.

Persons are occasionally brought to the hospital from the police cell, where they have been lodged some hours for real or supposed drunkenness, owing to the officers having become alarmed at the supervention of stertorous breathing. The case may have been one of apoplexy from the first, or it may be one of apoplexy following drunkenness, and must be admitted at once, or death may unfortunately occur at the station-house.

It sometimes happens that laudanum is taken with, or after, a quantity of spirits, and in such a case the symptoms of the narcotic will predominate, and the patient must be treated accordingly (*v.* opium-poisoning). A very excessive dose of pure spirit (drunk for a wager, or given to a child) will produce almost immediate death by *shock*, all the symptoms of which are presented in a marked degree.

Treatment.—To empty the stomach is the first indication, and this may be readily accomplished, if the patient is able to swallow, by the administration of an emetic (Zinci Sulph. ʒss. cum Pulv. Ipecac. ℈j) in plenty of warm water. When the emetic begins to act, care should be taken to support the patient so that the vomited matters may be at once ejected and not swallowed again, or perhaps find their way into the windpipe.

Should the case be more severe, and the patient unable to swallow, recourse must be had to the stomach-pump, which must be introduced through a gag, with the precautions mentioned at page 92, when warm water may be injected, and the stomach thoroughly washed out. Cold affusion is the most readily applied means of rousing the patient, and for that purpose the water should be poured from a slight elevation upon the head and chest. In addition, flipping the bare skin with a wetted towel is a very effective stimulus, particularly if applied to the soles of the feet and calves of the legs. In cases of very profound coma, mustard poultices to the calves and feet, stimulating enemata, and galvanism, may be employed to rouse the patient from the effects of the shock, whilst it may be necessary to administer small doses of diffusible stimulants—ammonia or ether—by the mouth, to excite the flagging vital energies.*

Opium-poisoning.—Laudanum is the preparation commonly employed; and in the majority of cases the diagnosis is at once simplified by the discovery of the bottle which contained the poison by the patient's side, or in his possession, and which may either be labelled or may contain a minute residue of the tincture, to be readily recognised by its characteristic odour and taste.

If seen soon after the administration of a large dose of laudanum, the patient will only be in a drowsy and stupid condition; but if sufficient time has elapsed for the poison to have produced its full effect (the period varying according to the dose and the condition of the stomach), there will be profound stupor, from which the patient can be roused only by great efforts, the breathing will be slow and feeble, and the pupils of the eyes *very strongly contracted.*

The distinction between opium-poisoning and apoplexy is sometimes required, and the conditions of the pupil and of the respiration are the best diagnostic points. In opium cases, the pupils being *equally* and strongly contracted, and the respiration quiet and slow; in apoplexy the pupils being *unequally* contracted or dilated, and the breathing laboured and stertorous.

Treatment.—The stomach is to be immediately emptied by the stomach-pump or an emetic (*vide antea*), and the contents should be examined, to confirm or otherwise the diagnosis made. The stomach should then be thoroughly washed out with warm water, until all trace of the laudanum has disappeared.

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* Consult 'Todd on Acute Diseases,' for fatal case of alcoholic poisoning in a child.

Cold affusion may be used to rouse the patient from his comatose condition, and he should then be made to walk about supported by two attendants, who should shake him and shout at him so as to prevent his dropping off to sleep.

[In hospital practice it will be found a great convenience to send to the nearest police-station for two constables to perform this duty, and the inspector will send relays of men as long as they may be required.]

Care should be taken that the patient has his shoes on during these forced marches, or his feet will suffer severely from the rough usage. The house-surgeon may apply an additional stimulus if necessary, by flipping the bare skin with a wet towel or a light cane, but of course this treatment must only be very moderately applied.

Strong coffee should be given at intervals as soon as the patient can swallow readily, and the house-surgeon must pay attention to the state of the pulse, for nothing can be more exhausting than the treatment pursued, and stimulants should therefore be administered in small quantities if the patient's powers appear to be flagging, more particularly if the attempted suicide is the result of want.

Care must be taken not to prolong the active treatment unnecessarily, for a patient has been known to have died of the exhaustion so produced, and to have shown unmistakeable signs after death of the over-zealous treatment to which he had been subjected. If moderately sensible, half an hour's rest and sleep at a time may be allowed until the dangerous symptoms have quite passed off, when the patient will probably require some days' rest before he is convalescent.

Oxalic Acid.—This is not an unfrequent agent in cases of poisoning, accidental or suicidal, the symptoms being an intensely sour taste in the mouth, followed by pain in the throat and stomach of a burning character. Vomiting may or may not be present.

Treatment.—Chalk suspended in water should be immediately administered, or magnesia if more readily obtained. Warm water may be given to encourage vomiting after the administration of the antidotes, but the stomach-pump should not be employed, on account of the damage the œsophagus and stomach have sustained.

Hydrocyanic Acid and the Cyanides.—Cases of poisoning by these agents are so rapidly fatal as ordinarily to be beyond medical aid. Should a case be seen before death has occurred, the suitable treatment would be cold affusion to rouse the patient, followed by warm frictions to the skin, ammonia to the nose, and an emetic as soon as the patient can swallow.

Mineral Acids.—Poisoning by the mineral acids is readily recognised by the immediate violence of the symptoms and the burns and stains upon the lips and clothes.

Treatment.—The administration of magnesia or chalk suspended in milk or oil. Stomach-pump *not* to be used, for the reasons given above.

Caustic Alkalies.—A solution of caustic potash, or what is termed 'soap-lees,' are the fluids most commonly taken by accident. A burning pain in the throat and stomach follows immediately upon the dose, and vomiting of grumous matter soon occurs. The reaction with reddened litmus paper would immediately decide the diagnosis if there were any doubt.

Treatment.—Vinegar and water, or very dilute lemon-juice, together with olive or almond oil.

CHAPTER V.

MINOR OPERATIONS.

Laryngotomy.—Since this operation is only advisable in the case of any sudden obstruction of the larynx, when every moment is of the utmost value, its rapid performance is of consequence, and so long as an opening is made in the crico-thyroid space it is a matter of minor importance how the incision is made. The finger carried down the middle line of the neck will readily enough distinguish the depression between the cricoid and thyroid cartilages, and the knife may be plunged in transversely without hesitation. If a free opening be made, the parts will gape sufficiently to allow an entrance for the air, but if not, they may be easily held apart until a tube can be procured. If necessary, the tube can be inserted readily enough, and it may not be superfluous (judging from what one sees in operations on the dead subject) to remind the young operator that the end of the tube must be directed *downwards*. The tube is easily maintained in position by a tape round the neck. It is recommended by some authorities to make the superficial incisions vertical, but there is no special advantage in that proceeding.

Tracheotomy.—This is frequently one of the most trying operations the house-surgeon will be called upon to perform, and it is essential for success that he should be thoroughly up in all its steps, and ready for every emergency. In children, the small size of the trachea and the closer proximity of the vessels render the performance of tracheotomy more arduous than in the adult; and the house-surgeon should take every opportunity of examining the relative anatomy, and of performing the operation in the dead-house, both on adults and children.

For the successful performance of the operation the position of the patient is of importance. The head should be thrown back, so as to stretch the neck and draw up the trachea as much as possible; but as the patient is generally struggling for breath, the recumbent position is almost an impossibility, though of course advisable. A caution is necessary here, and specially with regard to children; viz., not to let an over-zealous assistant draw the head so far back (at the same time closing the jaws) as to suffocate the patient before the operation is begun.

The operator should see that he has everything he may want close at hand, viz., scalpels, forceps, tenaculum, blunt hooks, tracheotomy tubes of different sizes and lengths, ligatures, sponge, &c.

The operator, being on the patient's right hand and having a trustworthy assistant opposite him, makes an incision from a little below the cricoid cartilage to the top of the sternum, and even for a little distance on the bone, when the neck is short, keeping very carefully in the median line. A rapid but careful dissection must then be made between the sterno-hyoid muscles down to the trachea, avoiding both the isthmus of the thyroid gland, which is generally at the upper part of the incision, and also the veins, superficial or deep, which should be held aside by the assistant with a blunt hook or pair of forceps. The trachea being exposed, a tenaculum should be fixed into the upper part of it, by which it may be drawn up and steadied, and the knife, being held with the *back downwards*, should be thrust into the windpipe three or four rings below the tenaculum, and made to cut up to it. In thus entering the knife the surgeon must be careful not to transfix the trachea, or even wound the œsophagus. The fact that the trachea has been opened will be immediately manifested by the rush of air and the expectoration of mucus through the wound, and a tube should be at once inserted, unless the operation has been done for a foreign body which it is hoped may be ejected by a forcible expiration through the wound, and which must for this purpose be held open with hooks.

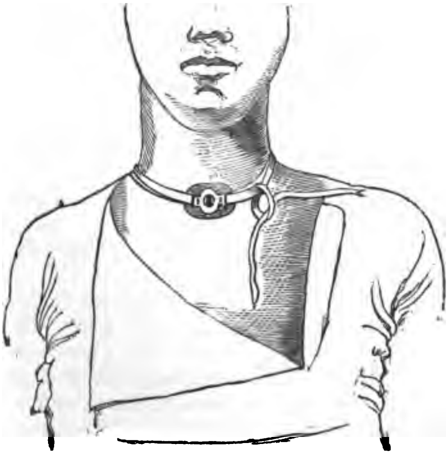
The insertion of the tube is often the most critical part of the operation, but has been much facilitated by the invention of collapsing tubes, which when closed resemble a wedge, and can therefore be readily introduced, and expanded afterwards by means of the second tube, which fits inside. If the surgeon is not provided with these tubes he will overcome the difficulty by passing the handle of the scalpel into the *upper* part of the incision, and then turning it so as to bring it at right angles to the trachea. This has of course the effect of opening the incision, and will allow an ordinary tube to be slipped in with facility below the handle. Some surgeons insert a tenaculum into each side of the trachea, and cut between them, using them afterwards to make traction upon the incision, but this is an unnecessary complication.

The dangers of hæmorrhage in the operation of tracheotomy are somewhat exaggerated. So long as the surgeon keeps steadily to the middle line he is not likely to meet with any large vessel in the adult, and in the child the innominate vein is seldom in danger if the knife is held as directed in the deep incision. The sources of hæmorrhage are the veins, which are generally much congested, and which may be found immediately in the line of incision; these, if it is impossible to hold them aside, must be cut and ligatured. The rule has been laid down, not to open the trachea until all bleeding has ceased; but as the hæmorrhage depends upon the dyspnœa and consequent congestion, this rule cannot be implicitly obeyed, and, provided there is no arterial hæmorrhage the trachea may be safely opened. What little blood enters the windpipe is immediately coughed out again, and does no harm, and it would take much more blood than is ordinarily shed, to choke the lungs as has been suggested.

The patient being often moribund before the operation is begun, may apparently die during its performance, but the tube having been inserted, recourse should be had to the various methods of artificial respiration, and even in the most desperate cases the surgeon's efforts may be crowned with success. In cases of croup a quantity of false membrane may be found semi-detached in the trachea, and can be extracted with a pair of forceps with the best effect.

To secure the tracheotomy tube satisfactorily is not difficult, provided a sufficiently long and large tube be employed so to as to fit comfortably into the wind-pipe and afford the patient an abundant supply of air. The outer tube should be provided with a slit (not a hole) on each side of the flattened front portion, and a tape long enough to go twice round the neck having been passed through one of the slits, both the ends are

Fig. 6.



to be carried round the back of the neck, when one of them can be passed through the other slit and the two tied in a bow at the side and quite out of the way of the tube (fig. 6). This is a better plan than *knotting* tapes on to the tube, which is apt to create an obstruction at the orifice.

The after-treatment of a case of tracheotomy is of great importance, and consists in keeping the tube clear, preventing the access of cold air, and supporting the patient's strength. For the first few hours a tracheotomy case should occupy the sole attention of an experienced nurse, who should sit by the patient's bed, and keep the tube constantly clear, either by detaching the mucus with a feather, or by removing the inner tube, cleaning, and then replacing it. In a croup case after a few hours there will be found within the inner tube a tenacious sticky material, which materially obstructs it and cannot be got rid of with a feather. The inner tube *must* then be removed and immersed in scalding water, which will effectually soften the mucus and allow of its being cleared. A good plan is to oil the surfaces of the inner tube, which both facilitates its removal and tends to prevent the accumulation of mucus.

The access of cold air, which would probably excite inflammation of the lungs, is best guarded against by keeping flannel wrung out of hot water, constantly applied over the tube, and this should be changed by the attendant as often as it gets cold. The amount of support necessary must of course be left to the judgment of the medical attendant.

The collapsing tubes, spoken of above facilitate the operation, and answer very well for cases where the tube is only retained for a few days; but if it has to be kept in the trachea for weeks or months, the old-fashioned double tube is preferable, since the granulations are apt to grow up between the edges of the divided tube and thus become a source of constant annoyance.

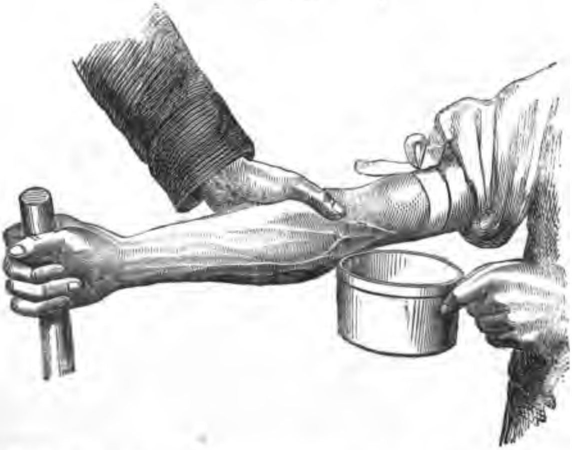
Paracentesis.—The house-surgeon may be called upon to perform *paracentesis abdominis*, or (more rarely) *thoracis*, in the medical wards. *Paracentesis abdominis* is best performed in the *linea alba*, and midway between the umbilicus and pubes. The operator should first satisfy himself that it is really a case of dropsy, and see that the bladder is empty. The patient being then brought to the edge of the bed, and placed on his side, a piece of macintosh cloth should be arranged so as to protect the bed from getting wet, and the necessary pails, &c., should be provided, to receive the fluid. Making first an incision through the skin with a sharp scalpel, the surgeon thrusts in a large trochar and canula, receives the first gush of fluid in a bleeding-basin, and then conducts the stream into a pail, thus avoiding all the splashing which otherwise is pretty sure to occur. When all the fluid has been drawn the wound can be closed with long strips of plaister, or, what is much more effectual, a hare-lip pin can be put through the edges of the wound, and a twisted suture applied over it. A flannel roller should next be firmly applied round the abdomen, and the operation is completed.

The above method is much to be preferred to the older practice of placing the patient in a chair, with a bandage round the abdomen, through a hole in which the trochar was thrust. The upright position has a tendency to produce faintness, and the fluid is not so readily evacuated in that posture.

Paracentesis thoracis is performed in the space between the sixth and seventh rib, near their angles, and the object of the surgeon is to enter the trochar at the *upper* border of a rib, so as to avoid all possible risk of wounding the intercostal artery. With the view of also making a valvular opening, the finger should be placed on the skin at the lower margin of the rib, and made to draw it upwards; with a scalpel a cut is then to be carried parallel to the rib, and the trochar entered. When the skin is allowed to resume its proper position the canula will slope downwards, the best position for evacuating the fluid, and when withdrawn it will leave a valvular opening in the skin.

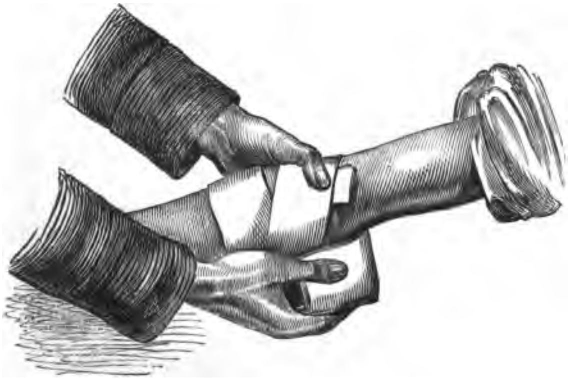
Venæsection.—A tape is to be carried twice round the arm, a few inches above the elbow, and tied in a bow. The veins being thus obstructed and made prominent, the operator is to choose the one he intends to open, remembering that while the median-cephalic is the safer, the median-basilic is generally the larger, and therefore yields a better supply of blood, but has the disadvantage of lying directly over the brachial artery. Standing in front of the patient and grasping the arm with the left hand, the thumb of which serves to steady the vein (fig. 7), the surgeon, with a sweep of the wrist, makes an incision (not merely a puncture) into the selected vein, taking especial care

FIG. 7.



not to go *through* it. An assistant holding the bleeding-basin the stream may be easily directed into it, and not a drop of blood ought to go on the floor or on the dress of the patient. If the blood does not flow readily, the patient may have recourse to the common plan of forcibly grasping a stick and moving the fingers about. When the required amount of blood has been abstracted the tape is to be untied, and the thumb of the operator placed over the wound. A pad of lint is then to be placed upon the wound, and maintained in position with the thumb, while a bandage is applied. This is done by making a turn round the arm below the joint, then going over the pad to above the joint (fig. 8), making another turn round the arm at this point, and lastly returning across the pad.

Fig. 8.



Bleeding from the jugular vein is rarely employed, but is performed in the following way. The left thumb of the operator is to be placed on the vein immediately above the clavicle, so as to obstruct the course of the blood. As soon as the vein is prominent the lancet can be used, taking care that the incision is made parallel to the *sterno-mastoid* muscle, and thus somewhat across the vein. When sufficient blood has been drawn, a pad is to be placed on the orifice, and a bandage to be applied over it and under the axilla of the opposite side, but the thumb must not be removed until the whole arrangement is completed, lest air should gain entrance into the vein.

Bleeding from the temporal artery is still more rarely performed, and consists in selecting the anterior branch of the temporal artery, and then making an incision across it, not so deeply, however, as to divide it. In order to arrest the hæmorrhage and prevent the formation of a false aneurism, the lancet must be made to *divide* the artery thoroughly, and a pad must be firml bandaged over the wound.

Incisions into inflamed parts.—Incisions may be necessary in carbuncle, erysipelas, &c., and they require care in their performance. An incision into a carbuncle, to do any good, must go right through it to the fascia beneath, and through the whole extent of brawny tissue; whether the incision shall be made crucial or not will depend upon the extent of the disease. Incisions in erysipelas, &c., should as a rule be made in the length of the limb, and not across it, and must divide the whole thickness of the cutis, since otherwise no relief is given to the tension. No fixed rule can be laid down for the length of the incisions, but it is better to make two or three small ones rather than one large 'gash' for the whole length of the limb.

In the case of all incisions, unless it is intended to abstract blood from the part, care should be taken to arrest the flow of blood thoroughly, before any warm poultice or fomentation is applied. This is most easily accomplished by placing strips of dry lint in the incisions and elevating the limb, or, if necessary, by applying in addition a bandage over the lint for an hour or two. The pledgets of lint should not be removed until they separate spontaneously in the poultice.

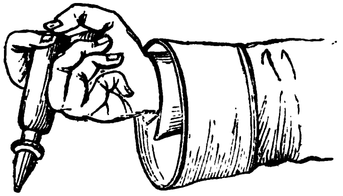
Abscesses frequently come under the house-surgeon's sole care, and he must open them on his own responsibility. In making the diagnosis of the presence of matter in a limb, the house-surgeon will do well to bear in mind one constant source of fallacy, viz., the sense of fluctuation imparted to the fingers by the fibres of the superficial muscles. This error is easily avoided by remembering (as any one can prove on his own thigh at any time) that pressure from *side to side* of a healthy limb will give a very exact imitation of fluctuation, but that if the pressure be made *in the length* of the limb or muscle, no such sensation will be produced. If deep-seated matter is suspected, but cannot be satisfactorily made out, the grooved needle, or a very fine trochar and canula may be used to explore, and a bead of matter being thus evacuated will render the diagnosis certain. In opening all abscesses care should be taken to cut parallel to, and not across important structures; thus abscesses in the limbs are opened by a longitudinal incision, and in the breast in a direction radiating from the nipple. Wherever it is possible the opening should be dependent, and in treating deep abscesses among important structures, the house-surgeon may do well to avail himself of the method suggested by Mr. Hilton ('Lancet,' November 10th, 1860), viz., to make a small incision in the skin, and then to thrust a director between the important parts to the abscess, which will be shown to have been reached by the escape of a small quantity of pus. A pair of ordinary dressing forceps can next be introduced along the director, and be opened so as to widen the aperture and give free exit to the matter.

Having made up his mind as to the existence of matter, and having begun to seek it, the house-surgeon should not be dismayed at having to go occasionally considerably deeper for it than might *primâ facie* have been expected, but should persevere in a careful incision until the abscess is reached.

Whitlows constantly require incision, and the following may be usefully borne in mind. The sheath of the tendons extends only to the *base* of the ungual phalanx of each finger, and hence matter in the soft pulp at the extremity, or round the nail, never finds its way up to the palm, and only a very limited incision, therefore, can be required for its evacuation. Matter in other parts of the finger, on the contrary, is frequently within the sheath, and unless it is evacuated by a timely incision, will creep up into the palm, and do irreparable mischief. The incision should be strictly in the middle line of the finger, so as to avoid injuring the vessels and nerves at the side, and should expose the tendons if the matter is within the sheath.
In opening abscesses in the palm of the hand, it should be bore in mind that the position of the superficial palmar arch is tolerably well indicated by the middle crease or groove in the skin of the palm, and that the bifurcation of the digital arteries is about midway between the front line and the roots of the fingers.

Introduction of eye-drops.—This little operation is constantly required, and demands a little care for its effective performance. It is essential that the fluid should be applied to the whole of the conjunctival surface, and for this purpose, the patient being seated with the head thrown a little back, the operator should gently separate the lids with the forefinger and thumb of the left hand, and apply the drop to the *outer* angle of the eye, taking care that it passes between the lids, and not outside them. To apply the drop, a camel's-hair brush, or better, the little spoon contained in every pocket-case, may be employed; but the neatest and most convenient method of introducing eye-drops is to keep them in the little bottles originally contrived for the purpose by Mr. Ernest Hart, the stoppers of which are pierced with a capillary tube, which is covered with a glass cap when not in use. Being kept not more than half full, it is only necessary to grasp the bottle, when the heat of the hand will be sufficient to expel a drop of the contents. The form of the bottle, and a convenient mode of holding are shown in fig. 9. In using it, the eyelids need not be widely separated; it is sufficient to introduce the apex of the conical stopper between the lids near the outer canthus, so that the fluid may follow the course of the tears, and sweep across the globe.

FIG. 9.



Plugging the Nares.—The anterior nares may be plugged with pledgets of lint, and if these are pushed as far backwards towards the pharynx as possible, and the whole cavity of the nose is filled with lint, introduced bit by bit, the more complicated operation upon the posterior nares will be but seldom required. For plugging the posterior nares, most hospitals are provided with a 'Belloc's sound,' *i.e.*, a piece of watch-spring with a ring at the end, and enclosed in a canula; but, if this is not at hand, an ordinary elastic catheter (No. 4 or 5) will answer every purpose. I would advise that the end should be cut off the catheter, and a double thread carried through it (which can be easily accomplished by the aid of a stilette), so that a loop may hang out of the cut extremity. It will facilitate the catching of the thread in the fauces if a knot be tied in the thread about two inches from the loop, which will have the effect both of preventing its receding into the catheter and also of causing it to project more into the mouth. If Belloc's sound is used, the thread will be passed through the ring simply, or a knot and loop may be formed as above recommended. The sound being passed along the floor of the nose, the loop must be made to project in the fauces, when it is seized with forceps and drawn out of the mouth, the canula being afterwards withdrawn from the nose. A roll of lint (which is better than sponge), being attached, can now be easily drawn up into the posterior nares, guided behind the soft palate by the forefinger. The ends of the thread are then to be tied round another roll of lint, close to the nostril, which serves the double purpose of keeping the plug firm, and of obstructing the anterior nares. When all danger of hæmorrhage has ceased, the posterior plug may be removed by a stream of water from a syringe, or by gentle pressure with a bougie through the nose. It has been advised by some writers to attach strings to the posterior pad which the patient is to swallow, until they are required for its dislodgment; the probable result of which unnecessary arrangement would be, that constant irritation and cough would be kept up, to the patient's great discomfort.

Puncture of tonsil.—An inflamed tonsil may be seen partially projecting towards the opposite side, and partly forming a tumour behind the anterior pillar of the soft palate, and it is in the latter situation that a puncture should be made. A sharp-pointed bistoury should be covered with lint to within three-quarters of an inch from the point, with the double view of avoiding injury to the lips and of limiting the depth of the incision. The mouth being open, and the tongue depressed, the point is to be carried ***straight back***, and thrust into the most prominent part of the tumour through the palate. The edge of the bistoury being upwards, the puncture can be readily enlarged, to give exit to matter, if it has formed, as it generally does, in the upper part of the gland. The incision in the palate is not of the slightest moment, and heals readily. The hæmorrhage, which is sometimes sharp for a few minutes, is from the palatine and ascending pharyngeal arteries, and never from the internal carotid, and will be easily arrested by the use of cold water. (See also p. 24.)

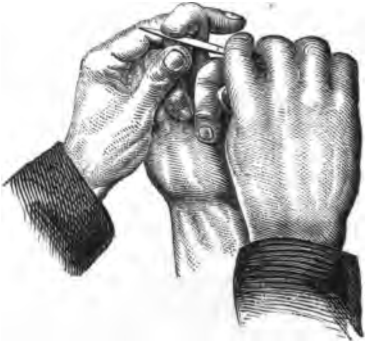
Removal of tonsil.—The house-surgeon should be prepared to perform the operation if called upon to do so, and will find the simple hooked forceps and bistoury as efficient instruments as the complicated 'guillotines,' which are always getting out of order, and require the attention of the instrument-maker after each time of using.

The curved probe-pointed bistoury should have the heel covered with a piece of lint, and is to be held in the right hand, while the forceps occupy the left. The patient's head being thrown a little back, and the mouth opened, the enlarged tonsil can be grasped; and if it is on the left side the surgeon will have no difficulty in passing the bistoury below it, and slicing it off, while standing in front of the patient. If, however, it is the right tonsil, in order to operate without changing hands the surgeon should stand on the patient's right, and, leaning over him, will be able to use both knife and forceps efficiently.

Amputation of fingers.—In cases of crushed fingers or gunshot injuries, it may be necessary for the house-surgeon to amputate a finger, but he should always avoid doing so if there is a probability of the member becoming serviceable by care and attention. Amputations at the joints are generally necessary, and are more easily performed than in the length of a phalanx.

To amputate the third or second phalanx.—Grasp the phalanx firmly, by means of a piece of lint, and bend it as nearly to a right angle with the next bone as possible. Place the heel of the scalpel or bistoury at the side of the joint, exactly midway in the thickness of the next phalanx (fig 10), draw the knife horizontally across the joint, which will fly open at once if the lateral ligaments have been thoroughly divided with the point and heel of the knife. Pass the knife through the joint, and cut a flap from the palmar surface of the phalanx. Probably no vessel will require a ligature, and the flap may be retained in its place with a couple of stitches and a strip of lint.

FIG. 10.



To amputate the first phalanx.—In doing this operation, the head of the metacarpal bone may be removed or not, according to the taste of the operator and occupation of the patient. The oval amputation is generally the best, and is performed by placing the point of the bistoury on the metacarpal bone near its middle, cutting along it to the joint and then passing in an oval sweep just below the joint so as to obtain sufficient flap. The flaps are then to be dissected back, without opening the joint, and the head of the metacarpal bone and a portion of the shaft are to be cleared of muscular fibre, when the cutting forceps can be applied to the bone, and the finger at once removed. The incision will, if properly made, form a single line when the edges are brought together.

The position of the incision will vary slightly in the several fingers; thus in the forefinger it should be placed as much on the outside of the metacarpal bone as possible, so that the scar may be hidden, and for the same reason on the inner side of the little finger. In the middle and ring fingers the incision is unavoidably on the back of the hand.

In removing the first phalanx of the *thumb*, the head of the metacarpal bone should be invariably left, since *any* thumb is better than nothing. With this view the incision should be brought well over the base of the phalanx, and taken almost circularly around it, so as to obtain flap enough to cover the head of the metacarpal bone, which is larger than one would *primâ facie* expect to find it.

This method may also be adopted in the fingers when it is desired to leave the heads of the metacarpal bones. (Consult also Fergusson's 'Practical Surgery,' p. 311—324.)

Amputation of toes.—This is generally a very simple matter, the crushed portions being removed and the flaps made in any way most convenient; and if there is not sufficient skin, the parts will granulate and cicatrize over without difficulty. The only caution necessary is, never to remove any of the metatarsal bone, nor in fact to open the metatarso-phalangeal joint, if it can be avoided, since the foot is thereby considerably weakened, and matter is very apt to find its way into the sole of the foot. It is better practice to cut through the phalanx with the bone forceps; and it must be borne in mind that the joint, if it *must* be opened, will be found to lie much higher up than is generally supposed.

Use of stomach-pump is most commonly required for the evacuation of poison from the stomach, but may also be needed in order to feed the patient. In either case it may be necessary to open the mouth forcibly, and this is most readily accomplished by using the screw-gag; for if the extremity can once be insinuated between the teeth, no power can resist it. The jaws being separated, the common wooden gag with a hole in the centre, can be tied in, and there will be no further obstacle. If the gag can be altogether dispensed with, as it can in most cases, so much the better.

The best form of stomach-pump is that in which the direction of the current is controlled by a lever grasped with the left hand, the tap plainly showing in which direction the stream is passing. The instrument is fitted ordinarily with a stomach and a rectum tube, the former having the holes at the side, and the latter at the extremity. Having oiled the proper tube, the house-surgeon should curve its extremity rather abruptly, and introduce it carefully, through the gag, to the back of the throat. In order to do this, the patient's head is generally thrown back; but when the end of the tube is felt to have reached the back of the pharynx, the head should be bowed forward, or else the vertebræ project and prevent the tube passing down the gullet. A little gentle, steady pressure will make the tube glide down the pharynx until it reaches the back of the larynx, where there is often a slight hitch for a moment; but this is readily overcome, and the tube passes into the œsophagus and stomach. The direction in which the tube should be pushed is *upwards* rather than downwards, and if a proper curve has been given to the end of the instrument, and it be kept strictly in the median line, there will be no difficulty. With an ordinary-sized tube it is next to an impossibility to pass by mistake into the trachea; but if the house-surgeon feels anxious about it, he can pass his finger down and make certain that the instrument is not in the glottis, which event would be immediately manifested by the urgent dyspnœa of the patient. Before attempting to withdraw any fluid from the stomach, some warm water should invariably be introduced so as to avoid all risk to the mucous membrane, and then by a series of steady movements the contents may be withdrawn, care being always taken not to remove quite as much fluid as was thrown in; and if necessary the stomach may be washed out in this way several times. A good deal of trouble is sometimes experienced from the eyes of the tube getting choked with undigested vegetables, &c.; when this occurs, the action of the pump should be reversed immediately, so that the fragment may be driven out; or if this cannot be done, the tube must be removed, cleaned, and reintroduced. In cases where valuable time is being lost from this cause, it will be better to introduce an emetic through the pump, and let it act in the ordinary way, taking care, however, that the patient, if insensible, is not suffocated by the vomited matters. In the case of young children a large elastic catheter forms the best tube, and this can be adapted to the pump by a piece of india-rubber tubing.

Introduction of rectum-tube and bougie.—Ordinary enemata are generally administered by the nurse; but in cases of obstruction or of stricture of the rectum, the house-surgeon will be called upon to introduce the instrument. The long tube commonly known as O'Byrne's, is to be introduced by the operator while standing behind the patient, who is placed on his left side. The house-surgeon's right forefinger, having been well soaped, is to guide the tube through the anus, and gentle pressure will then be sufficient in most cases to ensure its passing through the intestine. Sometimes the tube catches in one of the transverse folds of mucous membrane of the rectum, and only bends upon itself; when it must be withdrawn, straightened, and reintroduced, trying first one side and then the other of the intestine, so as to avoid the folds.

In the case of a strictured rectum, it is best, if possible, to pass the forefinger up to the stricture, and thus guide the bougie through the obstruction. When the stricture is high up, this is of course impossible, and careful manipulation must be trusted to alone.

Seton.—If only a single or double thread is to be introduced, the common needle will answer every purpose; but if a larger seton is required, the seton-lancet may be ûsed, or an ordinary bistoury and probe. The skin having been pinched up with the finger and thumb, the bistoury is thrust through the fold, and the probe carrying the seton is passed by its side; the bistoury having then been removed, the seton can be drawn through and detached from the probe, when the ends should be fastened together to prevent its slipping out unawares.

Issue.—When an issue is to be made with the *potassa fusa*, a piece of leather plaister should be laid over the part, a hole having been cut at the point where the issue is to be formed. A small piece of the potash is then to be placed upon the skin, and secured in its position by a piece of strapping over it; and in a few hours, when it has done its work, the strapping is to be removed, and the part carefully cleansed with vinegar and water, to prevent any portion of the caustic from passing beyond the intended boundary.

Cupping.—This operation requires a good deal of nicety in its performance, and is by no means so easy as it would appear. If the ordinary glass cups are used, it will be necessary to exhaust the air by means of the flame of the spirit-torch, or, as preferred by some surgeons, by inserting pieces of paper or cotton wool dipped in spirit, and then setting them on fire in the cup itself. Whichever method is employed, care must be taken not to heat the glass too much, or the patient's skin will be scorched. When the cups are fitted with a little exhausting syringe, the operation, though more tedious, is more easily performed.

Whether the cupping is to be 'dry' or 'wet,' the surface of the body should be sponged with warm water previous to the operation, and the cups be placed in a basin of boiling water before being used. The torch being then held beneath the cup, so that the flame enters it without touching the glass, the air thus becomes rarefied, and the cup should be immediately applied to the skin, and gently pressed on to it, so that the surface may fit closely to its edges.

When the skin has risen well within the cup, it may be detached by introducing the nail beneath its edge, and the operation of dry cupping is completed. The scarificator used in wet cupping should be kept scrupulously clean, and its blades very sharp, and before commencing the operation they must be graduated to suit the thickness of the patient's skin, which can be best ascertained by pinching up a small piece between the finger and thumb. Care must be taken, in the case of a fat patient, not to set the blades too deeply, or they will cut through the skin and let the little pellets of fat protude, and effectually arrest the flow of blood. In using the scarificator, it must be pressed carefully against the skin, or it may slip and make very irregular incisions, and the freshly exhausted cup must be applied immediately over the cuts. Each time the cup is removed, with its contained blood, the surface should be wiped with a warm sponge, that all coagula may be removed from the incisions before it is replaced, and the cups should be plunged into hot water. A piece of dry lint, with a turn of bandage, will control all further bleeding when a sufficient quantity of blood has been abstracted. In cupping on the temple, after the cup is fixed, the lower edge should be a little elevated, so as to take off pressure from the temporal artery beneath, or no blood will be obtained.

Application of nitric acid.—This will be necessary, occasionally, to arrest the progress of sloughing in important tissues. In order to render the application effectual, the part must be thoroughly dried; and since the destruction of tissues is necessarily painful, it will be well in severe cases to administer chloroform prior to the operation. The nitric acid should be the strongest fuming acid, and may be most conveniently applied on a piece of fire-wood, cut to a suitable point, this being preferable to the glass rod or brush. The acid should be applied feeely around the margin of the slough, and should involve a line of healthy tissue beyond the disease; for, unless this is done, the sloughing action will very probably recur.

A poultice, and especially the charcoal poultice, when the surface is extensive, forms the best after-treatment.

CHAPTER VI.

OPERATING-THEATRE. TREATMENT AFTER OPERATIONS. CHLOROFORM.

Operating-Theatre.—The position which the house-surgeon occupies in the operating-theatre varies very considerably in different hospitals. In some the colleagues of the operating surgeon alone assist, and the house-surgeon's duty is confined to handing instruments and sponges; in others, the house-surgeon administers chloroform; while in a comparatively small number, the operating-surgeon depends upon his house-surgeon and dressers for all ordinary assistance, and only asks the aid of one of his colleagues in cases of difficulty.

Believing the latter practice to be the best for all parties, including the patient, I shall confine these remarks to that arrangement.

The house-surgeon should take care that the patient who is to be operated upon under chloroform does not take any solid food for at least four hours before the hour of operation, although in the case of feeble patients the administration of stimulants may be advisable within a much shorter time. The theatre and passages should be thoroughly warmed, and the patient carefully wrapped up while being conveyed to the theatre, lest cold should be taken at this critical moment.

All the instruments which can by possibility be required in the operation should be laid out on a suitable table or tray, and be covered with a cloth; needles, ready threaded, should be stuck into some convenient cushion, so that they may not get entangled; and strips of plaister, lint, and bandages should be prepared, suitable for the expected operation. Hot and cold water are matters of course in an operating-theatre; but the house-surgeon should take care to have the means for heating a cautery at hand, whenever that instrument may possibly be required. It is well also to have a little wine or brandy, and some smelling-salts within reach, in case of sudden emergency.

The operating-table should have a folded blanket upon it, and a pillow or two. A piece of macintosh cloth should be placed over the part of the table at which the hæmorrhage will occur, and in addition a piece of "red cloth" over the macintosh will be useful in soaking up the blood, while a tray of saw-dust should be placed below to prevent drippings upon the floor. Everything should be perfectly ready before the patient is brought in, so that the administration of chloroform may be begun at once, if it has not already been administered in an adjoining room. A dresser should stand on each side of the patient while he is taking chloroform, to restrain his sometimes violent contortions.

The best position for the house-surgeon is, as a rule, *opposite* the operating surgeon, and he should have loosely noosed in his button-hole a sufficient number of ligatures, not less than sixteen inches in length. One dresser should take charge of the instruments, and should be instructed as to the order in which they will be wanted; and others will be required to hold the patient, to sponge, &c.

The sponges should be fine and soft, and scrupulously clean. They must never be used for any other purpose than that they are intended for, and particularly, should not be employed to wipe up blood from the floor of the operating-theatre. The sponges should be kept moist, but thoroughly squeezed out, so that they may be ready to absorb the blood directly they are placed upon a wound. Nothing can be more annoying to the operator than to have the wound filled with water by a careless assistant.

The patient being under the influence of chloroform, the part to be operated on is to be exposed, while the rest of the body and the clothes of the patient should be carefully protected with red cloths. The house-surgeon will be ready to sponge, hold back flaps, &c., as directed, and finally to tie the ligatures upon the vessels as the surgeon takes them up. (See p. 30.)

It is well worth the house-surgeon's while to practise tying ligatures privately, that he may commit no blunder in public. Since every drop of blood is of importance, the house-surgeon and other assistants should be on the alert to arrest at once the stream of blood from a divided vessel by placing a finger or sponge upon it, care being of course taken not to obstruct the progress of the operation by such measures. In the case of the operations for hare-lip, cancer of the lower lip, &c., the hæmorrhage will be more readily controlled by compressing the whole thickness of the lip between the finger and thumb than by any other method. It is always to be borne in mind that the convenience of the students and others in the theatre should be consulted as far as possible, and the assistants should therefore be careful not to stand in the way, and to obscure the view as little as possible with their hands and sponges.

The assistant to whom the office of holding a limb about to be removed by amputation is delegated, must be especially careful to have a firm grasp of it by means of a towel or bandage wrapped around the part, and should then draw the limb horizontally away from the body, and never either up or down, while the saw is being applied, since, if he does, either the saw will become locked, or the bone will be splintered.

The operation being concluded, the house-surgeon should carefully sponge away all traces of blood, &c., from the patient's body, and as far as possible from the clothes if they are besmeared, and should then see that the patient is carefully removed to bed.

Patient's bed.—While the patient is in the operating-theatre, his bed should be prepared for his reception according to the nature of the case. In any case of severe operation when the patient will be confined to bed for some time, a "draw-sheet," i. e. a sheet folded so as to be about a yard wide, should be laid over the ordinary sheet, and across the bed where the pelvis will lie; one end of this being tucked in and the other rolled up on the opposite side of the bed, a fresh portion of it can be drawn underneath the patient when required, with very little trouble. When the operation involves the urinary organs, &c., it is well to place a macintosh cloth beneath the draw-sheet; and a large sponge should be placed to soak up the urine in cases of lithotomy, &c. A draw-sheet, and in some cases a macintosh cloth, should be placed under the part in which the operation has been performed, and care should be taken to support stumps with suitable pillows, which should be covered with some waterproof material. The weight of the bed-clothes should be kept off the wounded part by a suitable "cradle," a very good substitute for which can on any emergency be improvised out of an old hat-box split open and stretched over a patient. Care must be taken, however, that the rest of the patient's body is not chilled by the action of the cradle, which can be remedied by the use of flannel or a hot bottle.

Treatment after operations.—Although the operating surgeon may give some general directions with regard to the after-treatment of operation cases, the supervision of them will fall principally upon the house-surgeon. The patient, particularly if not quite recovered from the effects of chloroform, should not be raised too much into a sitting posture when placed in bed, and this rule must be observed for many hours in cases where much blood has been lost. Sickness is unfortunately a very common sequela of chloroform, and may produce alarming exhaustion if not checked at an early date. Ice, brandy and soda water, and small doses of effervescing medicine, are the best remedies; but if these do not succeed, five minims of dilute hydrocyanic acid in effervescence, or a drop of creasote in a pill, will often do good, together with counter-irritation to the region of the stomach.

Stimulants may be needed from the first in very bad cases, but it is a great mistake to worry the stomach unnecessarily with them, and so perhaps induce sickness. The pulse will be the great guide in the treatment, and should that begin to lose power, stimulants must be had recourse to without delay, and at the same time care should be taken that the proper heat of the body is maintained. Opium in some form will probably be required for the first few nights after an operation, but the patient must not be allowed to get into the habit of taking that drug unless the peculiar nature of the case requires its administration. Night draughts, to be of service, should be administered not later than 8 p.m., but their general use should be discountenanced. A patient who has already taken opium, but cannot get to rest from the pain of an operation, &c., may sometimes be lulled at once by a few whiffs of chloroform, and may sleep for hours, but the administration of this drug must never be intrusted to a nurse.

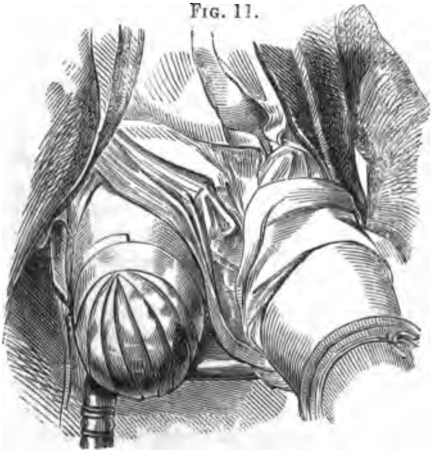
The amount of appetite after severe operations varies very considerably with different patients, some being able to resume their ordinary diet with relish on the day after operation, while others require milk diet, beef-tea, &c., for days together. It is, of course, impossible to coerce the appetite of a delicate patient; but the sooner he can be induced to resume meat and other nourishing food, and dispense with "slops," the better for all parties.

First dressing after operations.—In most cases the dressings applied in the operating-theatre may be left untouched until the second or third day, though this will vary with the heat of the weather and the amount of discharge upon them; for if the dressings become offensive at an early date, they should be changed without delay, to avoid all risk from decomposing matters in the neighbourhood of the wound.

The practice with regard to first dressings varies in different hospitals, some surgeons preferring to superintend the operation themselves, while others are content to inspect the wound after it has been prepared by the house-surgeon. In either case, everything that can be wanted should be at hand, so that the wound may not be uncovered longer than is absolutely necessary. Then, the patient lying in a comfortable attitude, and supposing the case to be one of amputation, the dresser should gently slip his fingers beneath the limb, and raise the stump from the pillow on which it is placed. This is often the most painful moment for the patient, and great gentleness must be practised and care taken to avoid shaking the stump, which must, however, be grasped tolerably firmly to prevent its being "jerked" by the involuntary spasm of the muscles. As soon as the stump is raised, the pillow and draw-sheet should be removed in order that they may be cleansed or renewed, and the house-surgeon is then carefully to remove the dressings. If a bandage has been applied, it must be cut with the scissors, and removed in pieces; and the dressings beneath, which, if originally wet, will have probably become dry and hard with clotted blood, must then be soaked with warm water, which should be allowed to trickle over them from a sponge into a basin beneath. With a pair of forceps the dressings are next to be withdrawn strip by strip, and while removing those in immediate contact with the edges of the wound care must be taken not to drag it open, which accident is best avoided by lifting the two extremities of the strip of lint at the same time, and so making traction towards, instead of away from, the margins of the incisions.

Any strips of plaister or sutures which may have been applied in the first instance are best left untouched at the first dressing, and all that need be done is to cleanse the edges of any discharge which may have accumulated upon them, and to apply fresh clean dressings. These will be water-dressing, or ointment, according to the fancy of the surgeon, the former being the cleanest and pleasantest, and the latter having a lesser tendency to adhere to the edges of the wound. Some surgeons content themselves with laying a large piece of wet lint over the stump, which can be covered with a piece of oil-silk and be wetted occasionally by the nurse; others prefer to apply the dressing in strips so as to support the stump, and then to put oil-silk and a bandage over it. In order to accomplish this, the strips of wet lint should be two inches wide, and long enough to reach six inches up on both aspects of the limb. With one hand the house-surgeon places a strip beneath the limb and holds it there, while with the other the end is brought up over the face of the stump and is laid upon the front of the limb. The moisture will give the lint sufficient hold to keep its place, while another strip is applied in the same manner to one side of it, but slightly overlapping, and the third upon the other side

FIG. 11.



in the same way. When the stump is sufficiently covered, a long strip of lint carried circularly over the ends of the other pieces will keep them in position, as shown in fig. 11. Great care must be taken not to disturb the ligatures, and particularly the one on the main vessel, which should have been distinguished by a knot tied in it. These should be carefully separated from the dressings if they should happen to adhere to them, and may be conveniently wrapped in a piece of lint spread with cerate, which will prevent their again becoming fixed to the surrounding parts.

In subsequent dressings the proceedings may be a little varied; thus, the strips of adhesive plaister will require renewing, and the same precautions must be taken in removing them as in the case of the strips of lint. Gentle pressure will probably be required to prevent matter from "pocketing" in the flaps, and the sutures may be removed as soon as they cease to be required to hold the edges together, or earlier if they begin to ulcerate through the skin, their place being supplied by straps of plaister and judicious bandaging. The ligatures should never be pulled upon unless it is evident from the lapse of time that they must have become detached from the vessel, and are simply lying in the wound, and even then great care must be taken of the ligature upon the main vessel.

Bed-sores.—Of all the annoying complications of surgical cases, bed-sores are the worst. The greatest care must be taken to *prevent* their formation, since, if the skin is once broken, it is a matter of the greatest difficulty to induce it to heal again so long as the patient occupies the recumbent position.

The slightest tenderness over the sacrum or hips should receive, therefore, immediate attention, and various applications have been suggested for the relief of the complaint. Equal parts of olive oil and brandy, gently rubbed with the palm of the hand over the tender spot for five minutes twice a day, will be found efficacious in rendering the skin tough and less sensitive to pressure. Collodion painted over the part is a useful application, and some surgeons prefer to cover the tender spot with amadou-plaister, so as to form a cushion over it. A water-pillow under the pelvis of the patient forms a most valuable addition to either of the above modes of treatment, and an old or emaciated patient, whom it will be necessary to keep in the recumbent position for any length of time, should be furnished with a water-pillow from the first, so that all risk may be avoided.

Paralytic cases require not merely a water-pillow, but a water-bed, since they are liable to bed-sores on all parts of the body, and even with this and all other applications it is impossible in all cases to prevent sores forming.

When the skin has unfortunately given way, the best application will be found to be a linseed-meal poultice, spread to the thickness of at least an inch, so that it may form a sort of cushion as well as a moist application. As soon as the sloughs have come away, stimulating dressings, *e.g.* the *Ung. resinæ*, may be applied under the poultice, which I prefer should be left for the sake of its softness and warmth, and when a healthy granulating surface has been produced, which will seldom be the case until the patient's health is so far amended that he is able to sit up, the *lotio rubra* or some other simple stimulant will be the best treatment.

The administration of chloroform.—Since the house-surgeon will frequently have to administer chloroform. or at least be responsible for its administration by others, it will be well to mention a few points of importance in connexion with the subject.

In the first place, as to the class of patients to whom chloroform should be administered. There seems to be every reason for believing, with the late Dr. Snow, that if a patient be in a state to undergo an operation at all, there need be no bar to the administration of chloroform on the score of diseased heart, &c., although, of course, where that condition is known to exist, it will be a reason for the exercise of additional caution. Whenever possible, care should be taken that the patient does not eat solid food for three or four hours previous to the operation, since the neglect of this precaution may entail more serious results than the troublesome vomiting and nausea, there being good ground for believing that in the presence of a distended stomach the heart is more liable to the frightful accident of paralysis from the local action of chloroform.

Although chloroform may be satisfactorily administered on a handkerchief, there can be no question that the inhaler renders the operation less dangerous, particularly in the hands of those not much accustomed to the use of the anæsthetic.

Dr. Snow's inhaler and Weiss's modification of it are the best forms for ordinary use; their superiority consisting in the fact that they provide, however imperfectly, for a uniform strength of chloroform vapour during the progress of an operation, and render it extremely difficult to administer a vapour so highly charged as to endanger the patient's life, by inducing paralysis of the heart.* It is needless to describe minutely these instruments, the principle of which can be seen at a glance, and may be briefly stated to consist of an arrangement for the maintenance of a tolerably *fixed temperature* round the blotting-paper from which the chloroform is evaporating, so that the inspired air contains almost always the same amount, or at all events never more than a certain per-centage, of chloroform vapour. The only practical cautions that need be given as to the use of either of these inhalers are, that the administrator should ascertain before using them that all the valves are clean and dry, and that the bibulous paper in the interior is arranged so as not to prevent the free passage of atmospheric air through the instrument, as also that the water in the external chamber is not hotter than 60° Fahr. The quantity of chloroform which should be put into either of these instruments at starting is the same, viz., two drachms, and the valve should be arranged so that the patient may breathe only a very diluted vapour at the commencement, since the full strength of pure chloroform is apt at first to terrify the patient, although it does not really endanger life. The administrator should allow the patient to breathe this very diluted vapour for a minute, or until all agitation has subsided, and should then gradually close the valve so that at length the full strength of the chloroform may be inspired. This little manœuvre occupies about two minutes more, and about a minute's further inspiration of the undiluted chloroform will almost always produce a degree of anæsthesia sufficient for the surgeon's purpose.

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* An apparatus has been contrived by Mr. Clover, which would appear to fulfil perfectly the requirements pointed out by Dr. Snow as essential to absolute safety in the administration of chloroform, viz., the production of an atmosphere of a constant strength, and never exceeding 4 to 5 per cent. of chloroform. From a bellows capable of containing 500 cubic inches, atmospheric air is driven in measured quantities through a vessel containing chloroform and surrounded by *hot* water, into a large bag, where the mixture of chloroform and air is stored up for use. As the quantity of atmospheric air is known, and as the whole of the chloroform is taken up in vapour by the atmospheric air, the mixture in the balloon must be of uniform strength, which is fixed at 4 per cent. The balloon is detached from the bellows when filled, and can be connected with a mouth-piece fitted with valves, and resembling that of Snow's inhaler.

The whole inhalation, then, should occupy about four minutes, and it is foolish to attempt to induce anæsthesia with greater rapidity.

The first symptoms produced in all patients are those of confusion of the intellect and thickness of speech. Next, the muscular system becomes affected, and it may either become slowly and quietly paralysed, or there may be an introductory stage of violent and spasmodic contraction of the voluntary muscles before they become palsied. The final condition is one of complete unconsciousness and muscular flaccidity, with calm and equable respirations (which become stertorous if the chloroform is pushed) and a complete abolition of the sensibility of the surface, which may be conveniently ascertained by touching the conjunctiva without producing any closure of the lids.

Certain practical differences between different patients are to be noticed, the most important of them being the distinction between those who do and those who do not pass through a stage of strong muscular excitement or convulsions. Setting aside all voluntary struggling from fright, &c., in the cases where there is violent struggling of an involuntary kind after consciousness is lost, the right course is to push the chloroform very decidedly, by closing the valve so as to allow the patient to breathe the whole strength of the vapour. Inexperienced bystanders are apt to be terrified by the appearance which a patient presents when struggling violently, with the features swollen and the eyes suffused, and to fancy that his safety demands an intermission of the inhalation. This congestion, however, is caused entirely by the spasm of various muscles and by the spasmodic catching of the breath, and the right course is to continue the administration until this spasm ceases, which it will soon do, and the patient's countenance will then at once become calm and of a natural colour. On the whole, it may perhaps be considered a favorable sign if a patient struggles, for such a one seldom exhibits any alarming symptoms of failure of the circulation; and, on the other hand, when the patient is quite still, it is necessary to keep a constant watch upon the pulse, because we are deprived of one very useful indication of the extent to which the chloroform has taken effect.

Hysterical patients, and persons who have been accustomed to hard drinking, or to a great deal of muscular exercise, seem to require more chloroform than others to produce the full anæsthetic effect; otherwise, the action of the drug is very constant, the same dose producing the same amount of insensibility in the majority of persons.

The extent to which the inhalation ought to be pushed is materially affected by the character of the surgical operation in hand. There are many operations which do not require absolute quietude on the patient's part, and which do not involve parts of exquisite sensibility, and in these cases it is not desirable to push the inhalation to the point of extreme muscular relaxation and well-developed stertorous breathing, but only so far as to abolish sensibility. But in cases where the operation necessitates perfect stillness, and also where the sensibility of the parts involved is high, as, for instance, in operations about the anus and genitals, it is generally necessary to produce complete flaccidity of the muscles and stertorous breathing, and to maintain this condition during the greater part, if not the whole, of the operation.

From time to time the administrator should test by inhalation the amount of chloroform in the instrument, and replenish it, a drachm at a time, as often as may be necessary.

With regard to the dangers of chloroform, the most alarming symptoms are those which indicate failure of the heart's action, such as fluttering or intermission of the pulse or sudden blanching of the face. Since the administrator should keep a finger on the pulse, any failure in the heart's action will be immediately recognised, and inhalation should be at once suspended until it has recovered itself. So long as the breathing is tranquil and even, but not too slow, the noisy respirations of some patients need excite no alarm any more than an occasional catching of the breath. It is only when difficulties of respiration are combined with pallor of the face, or a failing pulse, that they become really alarming, since the breathing will then be noticed to take place in *gasps*.

In all cases of apprehended danger the inhalation should be at once suspended, and unless the pulse and breathing recover themselves immediately, artificial respiration should be had recourse to without a moment's delay. A current of fresh air should be freely admitted by throwing open the windows, and by not allowing bystanders to crowd round the patient, and cold water may be dashed over the chest as an auxiliary measure, to assist in producing a forcible inspiration. Galvanism, &c., may be tried, providing it does not interfere with the artificial respiration, which should be continued for at least an hour before the case is given up as hopeless.

CHAPTER VII.

DRESSINGS.

Dry dressings are considered by some surgeons to have a tendency to induce immediate union of the injured surfaces, and partly for this reason, but still more for convenience sake, the first dressings of a wound are frequently dry. No special direction is necessary for the application of this dressing, which should consist of suitable strips of lint, but in removing the dressing it is necessary to soak it carefully with tepid water, in order not to tear open the fresh adhesions to which it will probably be more or less attached.

Water dressing is of almost universal application. It consists of a double fold of lint, of a suitable size, soaked in water or any lotion, over which is to be placed a piece of oil-silk or thin gutta-percha, to prevent the evaporation of the moisture. The waterproof covering should be *slightly* larger than the lint, and may be kept in its place by a strap of plaister or a bandage. This dressing occasionally produces a troublesome crop of pimples in the vicinity of the sore, and when this results recourse may be had to the dry dressing or the evaporating dressing (*q. v.*) for a time.

Water-dressing may be varied in form, to suit the exigencies of particular cases. Thus, many ulcers will heal best when the lint is cut so as to fit exactly to the shape and size of the sore, and the oil-silk must of course correspond. In some wounds, and particularly in stumps after amputation, the water-dressing should be applied in the form of long strips, which should encircle and support the flaps, the waterproof being applied over all (p. 103).

Evaporating dressing.—The advantage of this is the constant maintenance of a low temperature in the affected part. It is applied in its simplest form by placing a piece of doubled lint upon the wound, and letting the patient or nurse keep it constantly wetted with water or an evaporating lotion. To be of any service, the surface of lint must be fully exposed to the action of the atmosphere, a fact which is very commonly ignored, the part being carefully covered with the bedclothes. Care should be taken to protect the bedding and the rest of the patient's body from getting wetted, by the judicious application of waterproof cloths.

Irrigation is a more perfect method of lowering the temperature of a part, and has a direct tendency to prevent the occurrence of inflammatory action, provided the application of it be sufficiently prolonged; for if irrigation be suspended after a short time, the reaction will only be all the greater and the inflammation more severe. Irrigation, then, to be of any service, must be continued until all danger of inflammatory reaction is past and the wound has put on a healthy appearance. It may be most simply accomplished by placing a vessel containing water (iced) slightly above the level of the patient's bed, from which a piece of cotton-wick, or skein of worsted, can conduct the fluid after the manner of a syphon, to the affected part. This should be covered with a piece of lint into which the water may soak, and waterproofs should be arranged so as to protect the bed, and also to conduct the water into a suitable receptacle below. The syphon may be formed of gutta-percha or tin tubing, if preferred, or a pipe and stop-cock may be fitted to the bottom of a tin can, which is to be suspended directly over the injured limb.

The same form of apparatus may be used when it is desirable to have a stream of tepid or warm water constantly flowing over a part, as in crushes, gangrene, &c.

Ointments are to be applied on lint, and should be well worked up with the spatula before being spread, in order that their surface may be smooth and even. Some surgeons lay great stress upon the selection of the right side of the lint for the reception of the ointment, and differ as to which *is* the right side. The soft, flocculent side would appear the more reasonable, since, if the other is used, the lint possesses no advantage over ordinary linen.

It is claimed for greasy dressings that they are more readily detached from a sore, and thus cause no pain to the patient nor occasion any hæmorrhage. This is no doubt the fact, but water-dressings, if properly wetted, are as readily detached, and any one who has contrasted the appearance of sores dressed by the two methods under precisely similar circumstances, will not hesitate to give the preference to the water-dressing.

Collodion.—The proper method of applying collodion has been described under "Wounds of the face" (p. 14). The coating of collodion may be considerably strengthened by soaking strips of lint in it and applying them first to the edges of the wound, after which the collodion may be painted over all.

Collodion should be kept in a capped bottle, with a wide mouth, which should be large enough to allow the brush to remain in the fluid.

Sealing.—By sealing is meant a method of excluding the air from an ulcer, introduced by Mr. B. Holt, which leads to its rapid cure when once a healthy action is set up. The margin of the ulcer is covered with adhesive plaister half an inch wide, and a piece of oil-silk large enough to cover the wound is then fixed to the plaister by means of collodion and another wider edging of plaister is put over all. The transparency of the oil-silk allows the progress of the ulcer to be inspected with the greatest ease.

POULTICES.

Linseed-meal poultice is the one in common use, and the meal should be made from the crushed seeds, without any of the oil having been expressed.

The house-surgeon, although not often called upon to do so, should be able to make a poultice, which in no respect resembles the "dab" of half-dry brown material to which patients are in the habit of applying the term.

A piece of linen-rag will be required, two inches larger each way than the intended poultice. This being spread upon a board or table, a quantity of meal slightly larger than will be actually required is to be put in a basin which has been scalded out, and *boiling* water poured into it, a little at a time, until the mixture, which is to be *well* stirred, is brought to the consistency of thick porridge. It is then to be turned out of the basin upon the cloth, and spread with a large spatula or knife to the thickness suitable for the case (from a quarter to three quarters of an inch). The sides should now be neatly squared off about an inch from the margin of the rag all round, by cutting off the superfluous matter with the edge of the spatula, and each edge of the rag should then be doubled upon itself, and afterwards folded over upon the meal, thus forming a neat margin to the poultice, which prevents the escape of the meal or of the matter from beneath it.

If the water was boiling, and the preparation has been performed with proper activity, the poultice will be quite as hot as the patient can bear it, but if it has at all cooled it should be held to the fire for a few moments to restore the temperature.

A poultice should not be 'clapped on' a tender surface, but one end being gently laid on, the rest should be gradually allowed to cover the wound, and similar precautions should be observed in removing a poultice. A piece of oil-silk, or what is cheaper, oiled calico, should be placed outside a poultice, in order to retain the heat, and the whole must be kept in position with straps of plaister or a light bandage.

A little olive oil spread upon the surface of the poultice prevents the possibility of its adhering to the part on which it is applied, and it is advisable where the ordinary linseed-meal is used, though not absolutely necessary. Some persons recommend that a piece of fine muslin should intervene between the poultice and the sore, but by that arrangement the poultice loses nearly all its power. It may be advisable in the case of boils, &c., to limit the action of the poultice to the exact locality of the disease, and this can be readily done by cutting a suitable hole in a piece of soft linen, which may be placed over the affected part and beneath the poultice.

Bread poultice is seldom used in hospital practice, and is not so efficient or comfortable as the linseed. It is made from the inside of a stale white loaf, well crumbled, upon which boiling water is poured. This is to be covered and allowed to stand for a few minutes, when the water is to be strained off, and the resulting pulp to be spread with the spatula.

Charcoal poultice is directed by the Pharmacopœia Lond. (1851) to be made of bread, linseed, and powdered charcoal, but the bread is an unnecessary addition. The powdered charcoal should be *animal* and not vegetable, which has a much smaller disinfecting power.

Yeast poultice (P. L.) is made by adding yeast to a mixture of flour and water, and letting it stand before the fire until it rises. It is an uncomfortable application, and possesses no special advantage.

Poultices of different characters may be readily prepared by adding suitable drugs to the ordinary linseed poultice; thus, the tinctures of opium, henbane, or hemlock, or the *liquor sodæ chlorinatæ*, may be selected for each variety of case.

Strapping.—The common adhesive strapping answers perfectly for all ordinary purposes, but should it be too irritating to the patient's skin, the soap plaister may be substituted for it; and in some cases of disease of joints, &c., it may be well to have the plaister spread upon wash-leather. In some cases it may be advisable to substitute the opium or belladonna plaister where an anodyne effect is wished for, or the pitch plaister when counter-irritation is required.

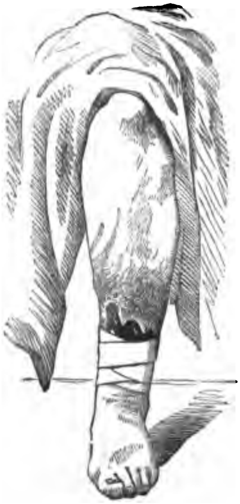
Strapping being mainly used to support the tissues, it should always be cut in the *length* of the piece of calico, so that it may not *give*, as it infallibly will do, if cut in the opposite direction. When applied to hold the edges of a wound together, the strapping should be long enough to go for some distance on each side, so as to take a firm hold of the tissues, and in some cases of wound it will be well to carry it quite round the limb, as will be shown in strapping an ulcerated leg. The edges of a wound should be held firmly together while the plaister is applied, and, as a rule, the traction of the plaister should be *upwards*, *i. e.* it should be affixed to the lower edge of a wound first. In removing strips of plaister from a wound, care should be taken not to drag it open, and to avoid this the strip of plaister should be lifted up at the ends and drawn gradually to the centre, whence it may be gently detached at last.

In ordinary wounds, where other dressings are to be applied, not more than one or two straps will be required; but in exposed situations (as the face), where other dressings cannot be conveniently applied, the strapping may be made to cover the wound entirely, being cut in small strips, which should partially overlap one another, and which may be again crossed by others, if necessary.

Ordinary strapping is soon decomposed by the secretions of a wound, and turns black from the lead it contains, and the part to which it is applied is often discoloured in the same way. This may be at once removed by gentle friction with a little olive oil, and the subsequent application of soap and water, and in the same way the house-surgeon may clean his sticky fingers more readily than with turpentine, as usually recommended. Plaister is readily warmed by holding it with the *plain side* against a hot-water tin, with which the operating-theatre, surgery, and each of the wards should be provided; or, more efficiently, by dipping the straps *into* the hot water for a minute or two. When treated in this way, the plaister lies much more smoothly, and can be more readily adapted to an irregular surface. A cloth should be used to soak up the superfluous moisture after the plaister is applied, and to press it close to the limb. Before using a sheet of plaister it should be wiped briskly with a dry cloth, to get rid of the dust and particles of plaister which collect on the surface.

To strap a limb.—The leg is the limb most frequently strapped, for the treatment of varicose ulcers, &c., but the arm might, if necessary, be treated in precisely the same way. The straps should be one and a half inch wide, and about twenty inches long, and should be applied from two inches below, to at least the same distance above, the ulcer, and where the veins are much enlarged, the strapping may be carried further up the limb with advantage. The heel being raised upon a stool, the surgeon, facing the patient, passes a well-warmed strap under the limb, and applies the middle of it to the back of the leg, then brings the ends over the sides of the limb and crosses them in front, the direction of the ends being upwards, so as to accommodate the inequalities of the limb, and enable the strapping to lie perfectly smooth, without any snipping. The next strap is put on in the same way, but is made to overlap the first for a third of its width, and so on throughout (fig. 12). In drawing the ends of the strap forwards, care must be taken to exercise sufficient but not too great traction, lest the patient should be unable to bear the pressure, and the whole thing have to be undone. It will be observed in the illustration that the *ends* of the straps are not seen, they having been carried on towards the back of the limb, and the straps should always be cut sufficiently long to pass, as in this instance, well beyond the margin of the ulcer.

FIG. 12.

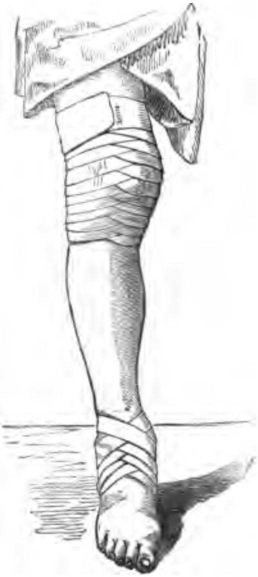


In removing strapping from a limb or joint, it saves both time and trouble to pass a director beneath it, and lay it open with a pair of scissors, and so remove the whole at once, instead of pulling off each strap separately.

To strap a joint.—The ankle or knee most commonly require the application of strapping, either alone or conjoined with other applications.

Ankle.—The strapping should be carried from near the roots of the toes to a couple of inches above the ankle-joint, and should be passed under the sole, and crossed over the instep as far as possible towards the heel. A second set of straps must then be carried up behind the tendo Achillis, so as to embrace the malleoli and cross on the instep, and thus the whole joint will be covered; the heel being left exposed, which is an advantage rather than otherwise (fig. 13). In order to make the plaister lie smoothly on the inequalities of the joint, it will be necessary to snip the edges in various places, and smooth each strap with the palm of the hand before applying another.

FIG. 13.



Knee. — Soap plaister spread upon wash-leather is the most suitable for strapping the knee or elbow. The straps are to be applied in precisely the same way as upon the leg, and must be long enough to reach thoroughly round the joint and cross in front (fig. 13).

Scott's dressing consists in the application of strips of lint spread with mercurial ointment in the same way as the straps, which are then to be applied over the lint so as to make pressure on the diseased joint.

To strap a testicle.—One or two methods have been described, but the following will be found simple and efficient. It is essential to shave off all the hair from the pubes and scrotum of the affected side, and the operator, sitting in front of his patient (who should stand with his back against the wall), is then to grasp the enlarged testis with his left hand and separate it from its fellow, pushing it well down to the bottom of the scrotum. A narrow strip of wash-leather plaister is then to be applied immediately above the testicle as tightly as it can be borne, so as to prevent the organ's slipping up again, and this strip should go twice round. Strips of ordinary strapping, half an inch wide, are then to be cut of sufficient length to reach from the ring of wash-leather vertically over the testis, and back to the same point on the opposite side, and these should be applied all round so as to envelop the testis completely. The simplest way is to apply one or two in front first, and then similar ones at right angles, as is shown in the engraving (fig. 14), and afterwards to fill in the intervals. A long strip of plaister, half an inch wide, is then to be wound horizontally over the other straps, beginning from as near the bottom of the testicle as conve-

Fig. 14.

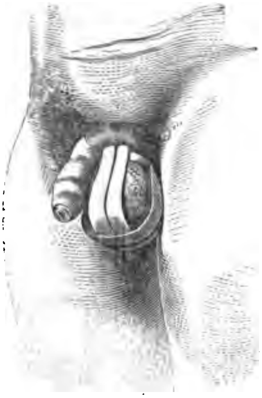
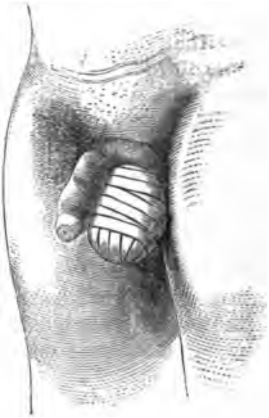


Fig. 15.

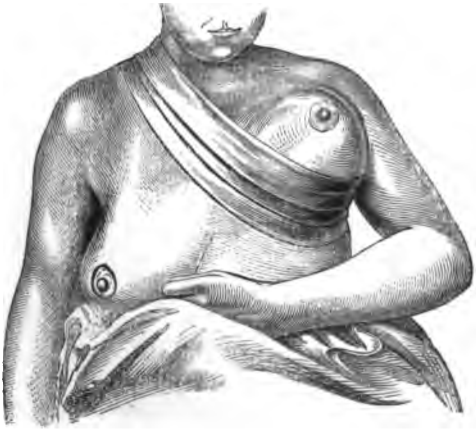


nient, and carrying it up over the original wash-leather ring so as to envelop the testis and keep all the vertical straps from slipping (fig. 15).

So long as compression is effected, the regularity of the strapping is a matter of secondary importance, and the house-surgeon must not be disappointed if he is unable to produce the picturesque appearance which is given in drawings *not* taken from nature. In a day or so the testicle will be found to have shrunk, so that the strapping forms a loose bag around it, and will require a repetition of the application.

To strap a breast.—This is one of the most efficient modes of giving support to an inflamed or enlarged breast, and has the advantage over the bandage of not getting loose. The straps should be from one and a half to two inches wide, and about thirty inches long; and the breast being held up by an assistant, the end of a strap should be firmly attached just above the

FIG. 16.



spine of the scapula of the opposite side, then brought over the clavicle, under the diseased breast, across the axilla, and round to the back again (fig. 16). The first strap should go just below the breast; the next, slightly overlapping it, should go a little higher; and so on towards the nipple, until the necessary support is given. If *compression* is desired as well as support, cross straps may be brought from the upper part of the axilla of the affected side above the nipple, and to end below the arm.

Strapping in fractures, &c.—Besides the above ordinary uses of strapping, it will be found a most useful adjuvant in the treatment of fractures, deformities, &c., both by fixing splints and apparatus more firmly than can be effected by bandages alone, and by giving the power of effecting traction upon a limb without exercising compression, which is often a matter of great importance.

CHAPTER VIII.

BANDAGES.

A thorough knowledge of bandaging is essential for a house-surgeon, and can only be attained by frequent practice. The material used for bandages varies slightly at different hospitals, but generally consists of coarse unglazed calico torn in lengths of from seven yards upwards, and of several widths to suit different purposes, the most commonly used being three inches wide. A bandage should be firmly and evenly rolled, for unless this is done it is impossible to apply it to a limb properly; and this may be accomplished either by hand or by one of the little machines invented for the purpose.

Bandages are called single-headed or double-headed rollers according as they are rolled in one or two parts, the former being the ordinary method, and always intended in the following pages, unless the contrary is expressly mentioned.

The following will be found to include all the bandages which can be required in the ordinary practice of surgery, but I have purposely avoided entering into the minute subdivisions and useless complications of the French school. If a surgeon is fully acquainted with all here described, he will find no difficulty in adapting his bandage to any out-of-the-way case which may occur to him.

In applying any bandage the operator should grasp the roll in one hand, and taking the loose end in the other, apply it to the limb so that the *outer surface* may be against the skin, by which the roller, as it is being carried round, will always lie close to the limb, and the bandaging will be much neater than if applied in the contrary way. The lower limb being the one to which a bandage is most frequently applied, I shall begin with that.

Spiral bandage.—The nature of the spiral bandage is indicated by its name, and it consists in covering a limb by a series of spiral turns, each overlapping the one below for about one third of its width. In practice, however, owing to the enlargement of the limbs at the upper part, it is impossible to apply this bandage without making 'turns' in it, *i. e.*, the bandage is folded upon itself so as better to accommodate the shape of the limb. To make these 'turns' neatly is the difficulty which besets the beginner, but if he attends to the following rules a little practice will soon overcome it. 1st. A turn should never be over a prominence of bone, and, where possible, should be on the outside of a limb. 2nd. However tightly the bandage may have been drawn before, at the moment of making the turn it should be held quite *loosely*, when with one movement of the wrist the necessary 'turn' may be made, and can afterwards be pulled as tight as may be necessary. (It is sometimes recommended to lay the forefinger of the opposite hand upon the bandage at the point where the turn is to be made, and to fold it over the finger, but if the above rule of holding the bandage quite *loose* is attended to, there is not the least necessity for so doing.) 3rd. In making the turn the hand should be held slightly above the level of the limb, and care be taken not to unroll more bandage than is actually required for its performance.

Figure-of-eight bandage.—The nature of this is also indicated by its name, and being formed without any turns its application is easier than that of the other variety.

The spiral is most applicable to the surface of the limb, while the figure-of-eight is peculiarly adapted for the joints. Either may be applied separately, as in the accompanying drawing, where the right leg (fig. 17) was bandaged with the spiral alone, and the left (fig. 18) with the figure-of-eight alone. It will be observed, however, that the spiral does not fit well around the ankle, while the figure-of-eight would have been very difficult to apply smoothly over the swell of the calf.

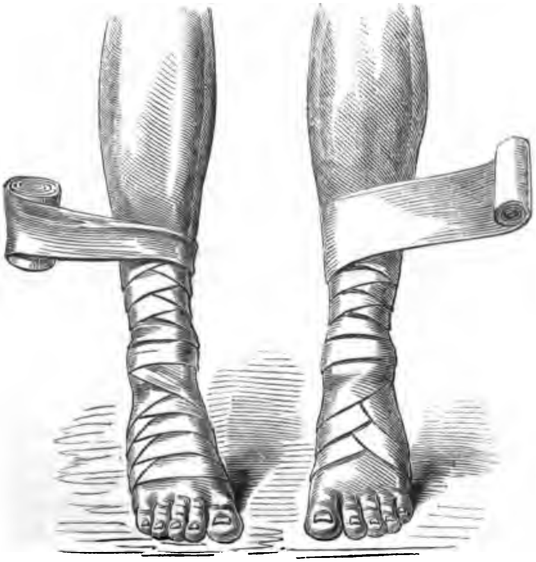
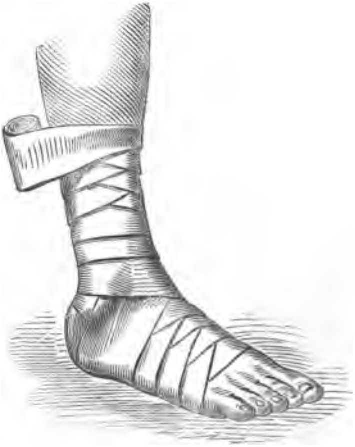


FIG. 17. FIG. 18.

A combination of the two is the best, as seen in fig. 19, where the spiral is used in the foot, the figure-of-eight round the ankle, and the spiral is begun again (at first plain, and afterwards with 'turns') in the leg.

FIG. 19.



It will be observed (in figs. 17 and 18) that the appearance of the two bandages is almost precisely similar; so that a skilful manipulator would carry his bandage from the toe to the groin, using the figure-of-eight over the ankle and knee, and the spiral over the limbs, without in any way interfering with the uniformity of its appearance.

In order to render the method of bandaging uniform, I always bandage *from* the inside of a limb, and thus bring the turns to its outer side. The operator, in order to do this while in front of his patient—the proper position—must be able to bandage equally well with both hands (an art easily acquired); for he will require to bandage the right leg with the left hand, and *vice versâ*. This method is, of course, not absolutely essential, but enhances considerably the symmetrical appearance of the bandages.

To bandage the leg.—To fix the bandage firmly (a most important point) a figure-of-eight turn should be made around the ankle, the foot being raised to a convenient height upon a stool. If it is desirable to bandage the foot, a few spirals and turns (fig. 19) may then be made over it, beginning at the roots of the toes; but if not, the bandage should take another figure-of-eight turn at once, overlapping the former by about one third of its width. This will give the bandage sufficient "spring" up the leg, and the spiral folds may be at once begun, the first two or so being plain, the turns then commencing on the outer side of the leg, and being continued as high as the bandage goes. In simply bandaging the leg, it is usual to leave the heel exposed; but if for any reason it is desirable to cover it, this can be readily done with a few extra turns alternately underneath and at the back of the heel.

To bandage the ankle.—The method of applying the figure-of-eight to this joint is sufficiently explained in the above paragraphs (fig. 18).

To bandage the knee.—The figure-of-eight is to be used for this, but its application requires some little care, or it will be found to slip. In order to fix the end, supposing the bandage has not been brought up the leg, it should be laid across immediately below the patella (fig. 20), and the bandage be carried round the limb below the knee, so as to cross it. The roller is then carried behind the ham to the inner condyle, and makes a loop embracing the thigh immediately above the joint; it is then brought behind the ham again to the inner side of the joint, and made to overlap the former loop neatly; then around the femur again, but lower than before, so as to make the next loop fit in properly, and so on, till the appearance of fig. 21 is produced, where the original loop around the femur is completely hidden by the folds of the figure-of-eight loops applied over it.

Fig. 20.

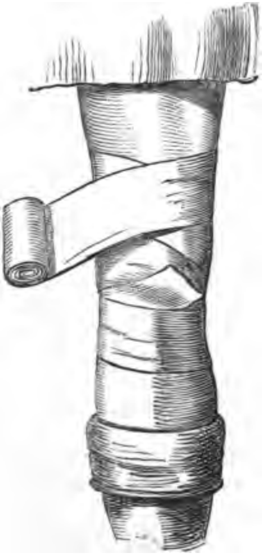
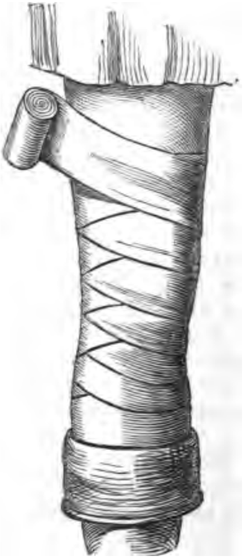
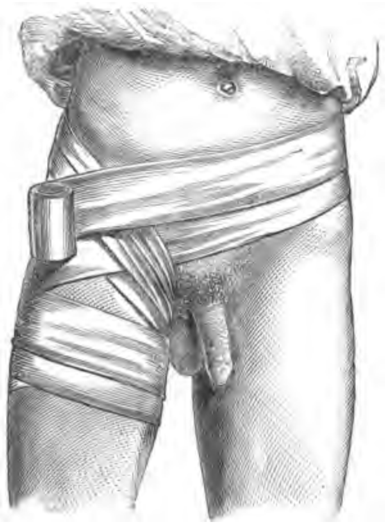


Fig. 21.



To bandage the groin: spica.—This useful bandage is best applied while the patient stands, the surgeon being in front of him. Two turns should be made round the thigh of the affected side, from within outwards (fig. 22), then the bandage is to be carried along the lower part of the groin, and over any pad which it may be desired to hold there, then to pass round the pelvis, and back over the pubes, crossing the former fold at the groin, and thus completing the figure-of-eight. A series of similar turns, each slightly overlapping the other, may then be carried round in

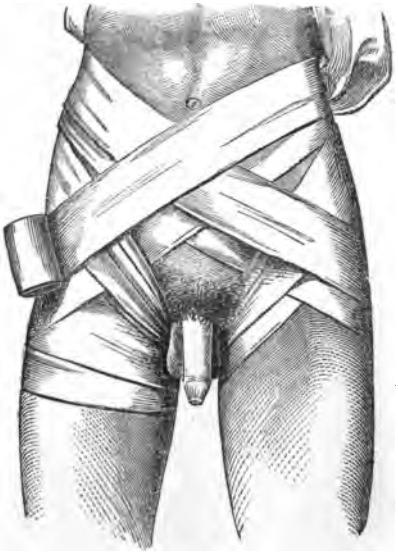
FIG. 22.



the same way, until the part is covered, and sufficient compression produced. In the drawing, for the sake of clearness, a space is left between the turns round the thigh and the remainder of the bandage; but this is not necessary or advisable in practice. The amount of compression in the groin may be easily regulated by increasing or diminishing the size of the pad, to which the bandage may be secured by a couple of stitches.

To bandage both groins: double spica.—Beginning in precisely the same way as in the single spica, the bandage is carried over the right groin, then around the pelvis, and (fig. 23) brought over the left groin to form a loop on the left thigh. It is now carried across the abdomen, to the right side, and encircles the body at the waist, whence it traverses the abdomen again to the right groin, crossing the commencement of the bandage there, and passing round the right thigh. A series of turns of this description will effectually cover both groins, as seen in the figure.

FIG. 23.

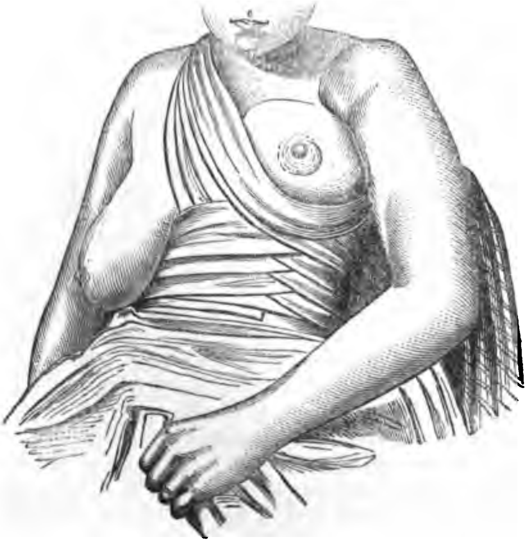


It must be noticed that the turns "round the pelvis" should be kept strictly below the brim of the pelvis, but that those "round the waist" will be at the level of the umbilicus, since the integrity of the bandages depends very much upon this being fully attended to. It will be also observed that, contrary to the French practice, I begin the spicas at the thigh instead of the abdomen, believing that the limb offers a much firmer starting-point than the constantly moving abdominal walls.

To bandage the breast.—A couple of turns are to be taken round the waist, immediately below the breast, in order to fix the bandage, which is then to be carried under the affected organ, and over the opposite shoulder; then around the waist, so as to fix the former turn, and next under the breast and over the shoulder again, and so on alternately until the breast is sufficiently covered and supported.

In the drawing (fig. 24), the bandage is only par-

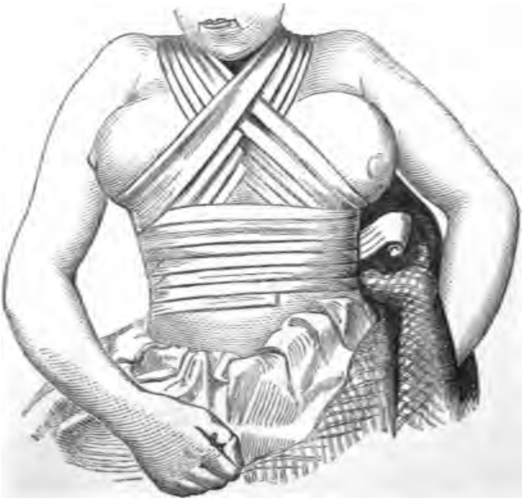
Fig. 24.



tially applied, and it will be seen that, at the last, two turns have been successively made under the breast, and this will often be found advisable. The next turn would go round the chest above or below the opposite breast, and so on, as high as might be necessary.

To bandage both breasts (fig. 25).—Beginning

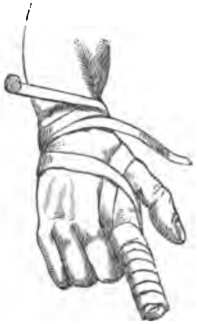
FIG. 25.



around the waist as before, the bandage is taken under the left breast and over the right shoulder, and then half round the waist again to fix the turn; next across the back to the left shoulder, across the chest and under the right breast, and round the back to the left side; the next turn is under the left breast, and half round the chest, and so on alternately, the folds being applied on the left from below upwards, and on the right from above downwards, and crossing alternately on the front and back of the chest. The order would, of course, be reversed, if the bandage were applied in the opposite direction round the waist at first, and it is immaterial which method is followed.

To bandage the finger (fig. 26).—A bandage, three quarters of an inch wide, will be most convenient, and a couple of turns (leaving out a loose end) should be made round the wrist; the bandage is then brought over the back of the hand, and taken in a series of spirals to the tip of the finger, which it surrounds, and is brought back by regular spirals in the opposite direction to the root of the finger again; crossing the former bandage on the back of the hand, it finally surrounds the wrist, and can be finished off by making a knot and bow with the loose end.

FIG. 26.



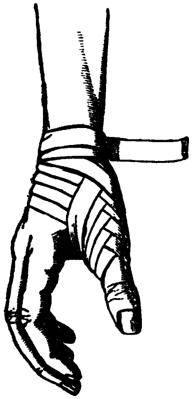
This bandage can be carried over any number of fingers by passing down them in the same way as above, after having made a turn round the wrist.

The penis may be bandaged in a similar way, but it will be sufficient generally to commence at the root of that organ, without going round the groins.

In applying simple dressings to either finger or penis, it will be sufficient to twist a piece of lint round a few times, after the manner of the above bandage, and finish off by splitting the lint and tying the two ends around the part.

To bandage the thumb: spica of thumb.—A bandage, about three quarters of an inch wide, should be fixed round the wrist by a couple of turns, from within outwards, and is then to be brought over the back of the thumb to the lower part of the first phalanx, around which it is to form a loop. Thus crossing itself at the phalanx, and passing over the back of the hand, the bandage will arrive at the outer side of the wrist, under which it is to pass, to descend upon the thumb, and form another loop, slightly overlapping the former one, and so on until the appearance given in fig. 27 is produced. The bandage is to be finished off by two or three simple turns round the lower end of the forearm.

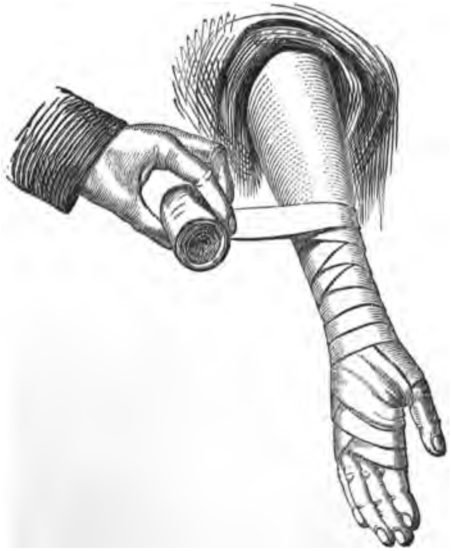
Fig. 27.



This bandage is very useful in maintaining pressure upon the ball of the thumb in cases of wound, attended with smart hæmorrhage.

To bandage the arm.—The bandage is to be fixed by a figure-of-eight turn around the metacarpus and wrist, and the bandage may then be commenced as near the fingers as desirable, by a series of figure-of-eight turns (fig. 28) passing over the back of the hand, under the wrist, and down again over the root of the thumb, thus crossing on the back of the hand in regular succession. As soon as the bandage is brought fairly above the wrist, a few plain spirals may be

FIG. 28.

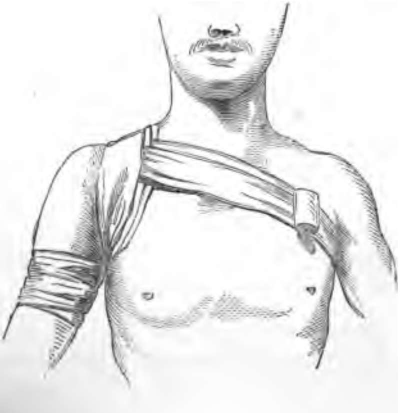


applied, and the "turns" may then be commenced and carried along the outside of the arm. Around the elbow-joint the figure-of-eight turns should be resumed and applied as on the knee, or as figured in the application of a bandage after venæsection (p. 83), and the "turns" may be again resumed in the upper arm. If it should be desirable to include the fingers at the same time as the arm, this will be best accomplished, first, with a small spiral bandage as shown in fig. 26, and the above can afterwards be applied over it.

Bandage for the axilla.—The bandage is fixed by a couple of turns round the upper arm from within outwards, and is then brought under the axilla and over the pectorals to the top of the shoulder. It next forms a loop around the root of the neck, and crossing itself is brought behind the shoulder to the axilla again. These figure-of-eight turns may be repeated as often as necessary, but it should be remembered that the one first applied is to be the highest up of the set.

This bandage may, if it is preferred, be carried under the opposite arm instead of round the neck (fig. 29).

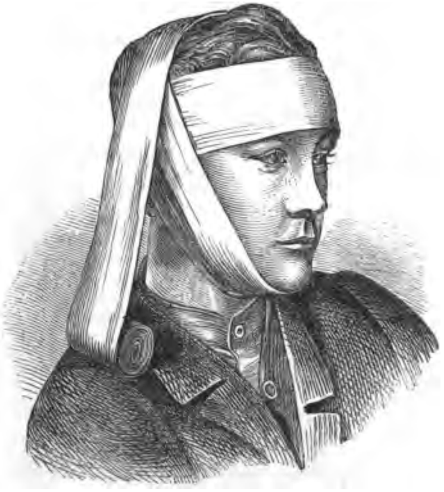
FIG. 29.



It will be commenced in precisely the same way, and the crossings will similarly be on the top of the shoulder.

Bandages for the head.—The simplest form of bandage for the head consists of a couple of turns round the forehead and occiput, but this is very apt to slip up unless conjoined with a turn under the chin (fig. 30). The circular portion is to be fastened with a pin just in front of the ear; the bandage, being folded down over it, can be easily carried under the chin and over the vertex. In applying this last turn or two, the roll of the bandage is necessarily reversed, as shown in the illustration.

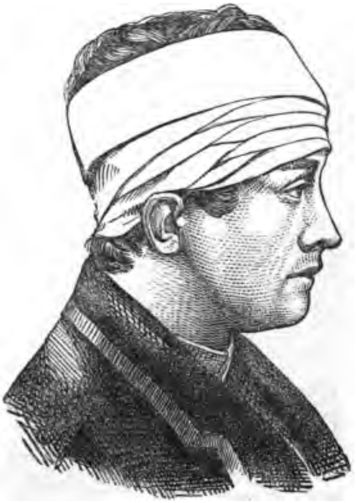
FIG. 30.



When dressings are to be kept on the top of the head, some of the turns under the jaw should be made first, so that they be kept in place by the circular ones, or, where it is desirable to avoid the unsightly appearance of the bandage under the chin, the circular portion should be applied and fastened with a pin at the forehead; a turn can then be taken over the head and pinned again at the occiput, and so backwards and forwards two or three times.

When it is advisable to apply pressure to the side of the head (wound of temporal artery, &c.), the following modification of the circular bandage will be advantageous:—After a couple of simple turns round the forehead and occiput, the bandage is to be made to ascend and descend alternately as it passes over the point where pressure is to be applied. The arrangement is seen in fig. 31, and closely resembles the appearance produced by making 'reversed turns,' none

Fig. 31.

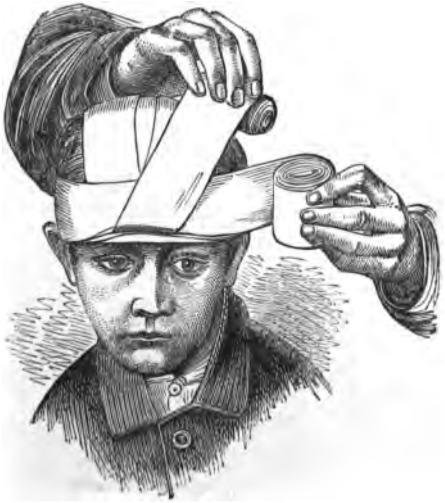


of which are, however, made, the bandage being kept flat to the head throughout.

Recurrent bandage of the head; capeline.—This bandage is an exceedingly useful one for keeping dressings upon the head, or for making pressure upon the integuments after extensive scalp-wounds. It has the disadvantages of being a little difficult to apply, and of being rather hot.

A double-headed roller, two inches wide, is required, one head being a third larger than the other. The patient being seated, the operator stands behind him, and taking the small roll in the right, and the other in the left hand, applies the intermediate portion of the bandage upon the patient's forehead. It is essential that the commencement of this bandage should

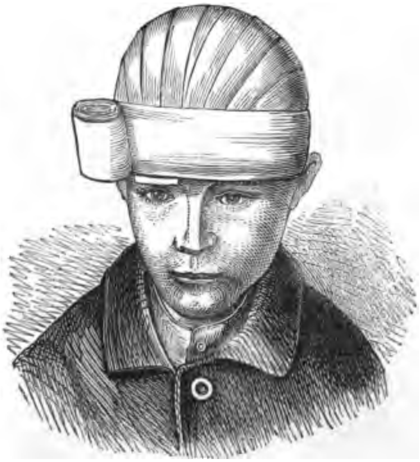
FIG. 32.



be as low on the brow as possible, and the rolls are then brought round the side of the head to as low on the occiput as convenient, for this will vary somewhat with the shape of the individual's head. The bandage in the operator's left hand is now to cross the other, and to be transferred to the right hand, while the other bandage is to be folded over it and carried along the middle line of the head with the operator's left hand.

The bandage now in the right hand continues its horizontal course around the head to the forehead, where it again crosses the other bandage and passes round to the occiput. The vertical bandage is folded back over the horizontal (which keeps it in position), and passes a little to the left side of the middle line to the occiput. It is then crossed again by the horizontal bandage, and passes forward to the *right* side of the middle line, and being again crossed by the hori-

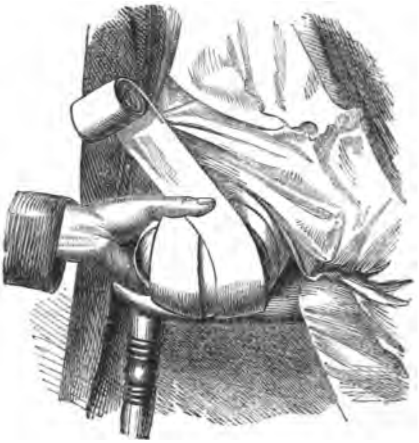
FIG. 32.



zontal, passes to the occiput on the left, overlapping the former fold in the same direction. This is the point in the application shown in the illustration (fig. 32), and the hands having just exchanged bandages, are seen passing the one in an horizontal, and the other in a nearly vertical direction. These turns, from before backwards and in the contrary direction, are regularly continued until the whole head is covered, when the horizontal bandage is to make a few extra rounds, so as to keep all tight. The result is seen in fig. 33, where the end of the vertical bandage has been left hanging out to show how it is finally secured by the horizontal turns. It will be observed that all the folds from forehead to occiput are on the left of the middle line, while those in the contrary direction are on the right. Great care should be taken to keep the horizontal bandage low down on the brow, and to place the crossings of the bandages as near to the middle line as practicable.

To bandage a stump.—The object of this bandage is not only to confine the necessary dressings, but, in addition, to support the flaps, and counteract the tendency of the muscles to drag away from the cut extremity of the bone. In order to accomplish these objects, the bandage should be begun at some distance from the end of the stump, and be carried round it with moderate tightness from above downwards, for a few turns; the right hand then holding the roller beneath the limb, the left is to grasp the part, so as to fix the bandage with the tips of the fingers at that point. The roller can now be brought up over the face of the stump, and be fixed in front with the thumb (fig. 34), to be taken back again a little to one side of the first fold, and again secured with the fingers: and this can be repeated until the stump is sufficiently covered, a few circular turns being made at the last to secure the folds in their proper places; or, if preferred, a circular turn may be made after each fold across the stump, so as to secure it at once, and so set the left hand more at liberty.

FIG. 34.



The **T** *bandage* is a useful apparatus for keeping dressings on the perinæum or anus. It is formed of one piece of bandage to go round the waist, and fasten by tying, or with a button, to the centre of which another piece is attached, to pass between the thighs and be fastened to the circular portion in front. This vertical portion may be conveniently split towards the end, so as to pass on each side of the scrotum, and may be used to keep dressings upon the groins, if the ends are made to diverge well in front. An extemporaneous **T** bandage may be formed from an ordinary roller by fastening it around the waist with a knot in front, then carrying the end between the thighs, and on one side of the genitals, looping it over the circular bandage behind, and bringing it forward again on the other side of the genitals, to fasten in front. This is the form ordinarily applied after the operation for *fistula in ano*, &c., but is then generally commenced behind.

Many-tailed bandage.—This may be formed in two ways, either by taking a piece of calico or muslin the length of the limb and wide enough to go at least once and half round it, and then tearing it transversely from each side in strips, two inches wide, to within a couple of inches of the middle; or by making a number of strips of equal length of ordinary bandage, and then attaching them along another central piece at right angles, with a needle and thread. In either case the central portion is to be applied to the back of the limb, and the transverse pieces folded over it in regular order, beginning from below. In stitching the transverse strips to the central portion, the upper strip should be attached first, and the next made to overlap it slightly, and so on to the end, so that when folded over from below upwards each turn may overlap slightly the one below it, and so give additional support. This is an advantage which the bandage does not possess when made from a single piece of calico.

The many-tailed bandage is applied to limbs which require constant dressing, but which it is desirable should not be moved, as they would of necessity be for the application of the ordinary roller.

Handkerchiefs may be usefully employed in some cases, either as temporary or permanent supports. Thus, the ordinary sling for the arm is formed by looping a folded handkerchief round the neck, while dressings on the groin or in the axilla may be readily maintained by similar means. The use of handkerchiefs in British surgery is not of sufficient extent to require a detailed account of the various methods of application, which will be sufficiently appreciated by referring to the descriptions of the corresponding forms of bandages.

To tie in a catheter.—Various modes of performing this operation are practised, of which I shall describe three, as being most commonly used.

In all cases, if a silver catheter is used, the tapes will be made fast to the rings at the end of the instrument, but if an elastic catheter is preferred, the tapes must be fastened securely to it by means of a clove-hitch, the nature of which is described in the chapter on dislocations.

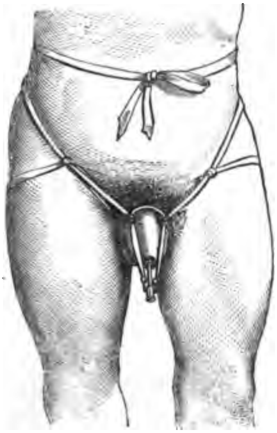
1st method.—A piece of narrow tape, about twelve inches long, is passed through both rings of the catheter, and the ends are brought down the opposite sides of the penis. The foreskin is then drawn well forward, and a piece of strapping, half an inch wide, is carried circularly round the body of the penis three or four times immediately behind the glands, enclosing within it the ends of the tape. This method is very effectual provided the skin has been drawn well forward, for otherwise the catheter has too much *play*. The strapping round the penis does not produce chordee, as might have been feared, since the plaister only adheres to the skin without materially compressing the organ itself.

2nd method.—A tape is passed through the rings as in the former case, but a greater length is necessary. The ends are to be brought on each side of the scrotum and over the buttocks, to be fastened behind to a bandage passed round the waist.

This method holds an instrument very securely in the bladder, since it is impossible it can come out while the extremity is directed downwards, as it is if the tapes are properly tightened; but it is unsuitable on this account, therefore, for cases where there is a tendency to chordee.

3rd method.—For this an ivory or gutta percha ring, large enough to go easily over the penis, is necessary. As this method is a little complicated, it is well to avoid its repetition every time the catheter is changed, by tying separate pieces of tape to the rings of the instrument, so that it can be freed without removing the whole bandage. The tapes are brought down on each side of the penis, and are *knotted* to the ring around the root of that organ, the length of the tapes being accurately adjusted, so as to hold the catheter in its proper position; the tapes are then carried round underneath the thighs and encircle them, a knot being formed in the centre of the groin on each side. The ends are next carried round the loins, and having crossed are finally tied near the umbilicus (fig. 35).

FIG. 35.



Care must be taken that the ring is amply large enough, and that the portions of tape on each side of the penis are maintained sufficiently short.

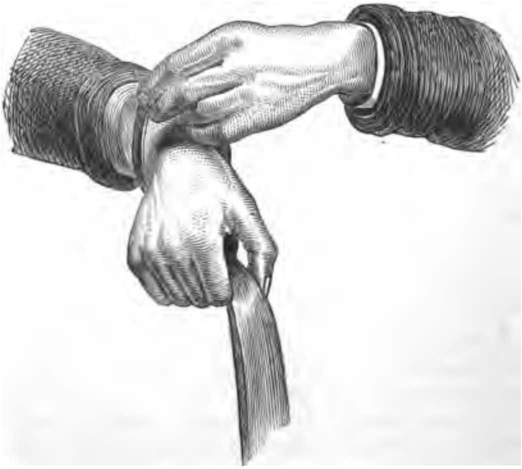
When a metallic instrument is used, the ordinary stilette will be sufficient to restrain the flow of urine; but when an elastic catheter is preferred, a little wooden spiggot must be fitted to it. In cases of injury to the bladder, &c., when it is desirable to carry off the urine as fast as it is secreted, a bullock's bladder or india-rubber bag may be tied to the instrument, or the end may be put into a suitable urinal.

A canula or catheter passed through the rectum into the bladder is best maintained in position by four tapes, two passing in front, and two behind, to a circular band round the waist.

A catheter, when retained for any time, is apt to become clogged with mucus, &c., and if it is undesirable that it should be removed at the moment, it may be readily cleared by passing a stream of water through it by means of the india-rubber bottle described in the section on "Washing out the bladder" (p. 63).

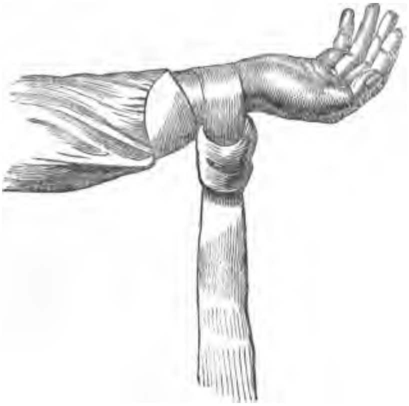
To tie a patient for Lithotomy.—This operation is frequently bungled in the operating-theatre, to the annoyance of both operator and by-standers. The bandage, usually of flannel or soft, broad, worsted

Fig. 36



tape, should be about a yard and a half long when doubled, and the assistant who is going to tie should make a noose in it, by placing the centre of the double over his own wrist, then taking hold of the bandage lower down and drawing it through the loop on the back of his hand (fig. 36). The noose thus formed is to be fastened securely round the *wrist* of the patient on each side by a couple of assistants (fig. 37), and when the operating-surgeon gives the signal (generally after the staff is introduced), another pair of assistants should bend the patient's knees and place his feet in the palms of his own hands. The first pair of assistants are then to bind the hands and feet firmly together, by forming a series of figure-of-eight turns round the ankle and wrist with the ends of the bandage, finishing off in front of the ankle-joint with a bow. The patient is then brought to the edge of the table, and an assistant on each side holds the knees steady, and in the positions the operator may indicate.

FIG. 37.



Retractors are not nearly so often used as in former days, but the house-surgeon should know how to make one if desired. In amputations of limbs with a single bone a retractor of two tails is required, while where there are two bones one with three tails will be necessary. A retractor is made of a piece of calico of a width suitable to the size of the limb, and about three feet in length. One end should be split and torn up to the centre of the retractor, where a small circle may be cut out with the view of accommodating the bone better. The three-tailed retractor is made in the same way, but is split into three parts, the middle one being intended to pass between the bones.

CHAPTER IX.

FRACTURES.

The entire subject of fractures is much too wide to be treated of systematically in a hand-book like the present, and it is to be supposed that a house-surgeon, besides having a general knowledge of the subject from previous reading, will possess some larger work on surgery, to which he may refer for any minute point of diagnosis. In the following pages, therefore, I shall merely enter into such details of the treatment of the ordinary fractures as may be useful to the house-surgeon, leaving him to refer to the works of Fergusson, Erichsen, and Druitt, or to the elaborate American work by Dr. Hamilton, for further information, and for varieties of treatment other than those in common use in English hospitals.

Diagnosis.—In the majority of cases there can be no doubt as to the nature of the accident on its first admission. The distortion of the limb and the inability of the patient to perform the ordinary movements will sufficiently mark the nature of the case, which will be further confirmed by the sensation of crepitus imparted to the hand placed over the seat of injury, while the limb is gently moved. When it is perfectly obvious that the bone is broken, it is only cruelty to twist and turn the limb about merely for the sake of producing crepitus, and thereby injury is often done to the soft parts and the amount of extravasation is in all probability increased.

The errors into which the young surgeon may possibly fall are, first, in mistaking a deformity resulting from an old injury for a recent fracture (particularly if the patient should not be able to answer questions from drunkenness, &c.), and, secondly, mistaking the crepitus of a joint for that of a fracture. The latter is the more common error, and fortunately does little real harm. To guard against this it will be necessary to notice whether the *entire* bone moves when rotated, or whether (as in fractures) the crepitus is produced in the length of the bone; careful measurement and comparison with the opposite side will show also that there is not the *slightest* difference in the length of the limb, and the patient, if urged to do so, will probably be able to exercise an amount of force with it which would be incompatible with the existence of a fracture. Women who have been hard at work all day at the wash-tub not unfrequently find at night that a swelling has taken place at the lower part of the arm, which they attribute to some blow, and apply at an hospital for relief for a supposed fracture of the radius, which the swelling and obscure crepitation cause it to resemble pretty closely; and in the same way persons with rheumatic joints who may happen to meet with an accident, exhibit an amount of crepitus which might very possibly mislead the unwary surgeon. The house-surgeon need scarcely be warned not to concentrate his attention entirely upon the injury in one limb, to the neglect of fractures or other injuries in other parts of the body, but such cases of inattention have actually occurred.

Simple fractures.—In the examination of simple fractures the greatest care must be taken not to convert them into compound ones by rough manipulation, which might cause a spicula of bone to perforate the skin: and in all cases, therefore, of supposed fracture, the limb should be thoroughly exposed by cutting open the clothes before it is manipulated in any way.

The time chosen for "putting up" fractures varies a little in different hospitals, some surgeons applying splints, &c., immediately, others preferring to wait until all swelling has subsided; but this only applies to fractures of the lower extremity, those of the arm being dressed at once and treated for the most part among the out-patients. If a fracture is quite recent, it will, I believe, be found most convenient to put it up at once, since the subsequent swelling is thereby often entirely prevented; but should some hours have elapsed since the accident, and the limb be already swollen, it is impossible to put it up in its final apparatus, and it may, therefore, be laid on a pillow, or loosely fastened upon a splint until the swelling has subsided. In all cases where the treatment has been immediate, the possible occurrence of subsequent swelling must be borne in mind, and the patient, if allowed to go home, should be strictly enjoined to come and show himself within twenty-four hours, or earlier if the limb become painful or numbed. In the hospital a little care will prevent any untoward results from tight bandaging, &c., but it does occasionally happen that a limb will swell imperceptibly, or while the patient is asleep, and produce an injurious amount of constriction, and the house-surgeon should therefore take a look at all recent fractures the last thing at night. Should the amount of swelling which has already taken place interfere with the diagnosis of the injury, it will be better to use palliative measures, such as cold lotions and a sling, until the swelling has gone down, and in obscure cases it will be only right to take the visiting-surgeon's opinion before commencing a course of treatment.

Since in certain cases of obscure injury about the upper end of the femur and humerus, impaction is one of the best forms a fracture can take, it would be a very bad practice to undo the natural cure thus effected by rough manipulations, though by so doing the diagnosis might be rendered more complete.

Dislocations accompanying fractures of the shafts of bones should be reduced as soon as the limb has been firmly put up in splints, so that it may receive no further injury; but in fractures of or near the articular extremities with dislocation of the fragment, as in the case of fracture of the upper end of the humerus with dislocation of the head, it will be necessary to lift the head of the bone, if possible, into its proper place before the fracture can be properly set.

The administration of chloroform is often of the greatest service in cases of fracture, both by enabling accuracy of diagnosis to be attained, and by assisting in the reduction of the broken fragments by completely relaxing the muscular spasm, and thus, in many cases, obviating the necessity for the division of tendons, &c. The advantages of the use of an anæsthetic in cases of fracture complicated by dislocation must be still more obvious.

Compound fractures should, if possible, be converted into simple cases as soon as possible, by healing the rent in the skin. When the injury to the integuments is recent and slight, a piece of lint covered with collodion is the best application; but where a crushing force has been applied and the skin is so damaged that union by first attention is impossible, it will only do harm to convert a sore into an abscess by sealing it up, and water dressing, therefore, or a poultice will be the best treatment.

The question of amputation in compound fractures must of course be left to the visiting-surgeon, and the house-surgeon should not hesitate to request his immediate attendance should any of the following complications be present:—1st. Great comminution of the bones and destruction of soft tissues. 2nd. Two or more compound fractures in the same limb. 3rd. Rupture of, or severe injury to, the principal vessels and nerves of the limb. 4th. Compound fracture into a large joint.

Setting fractures.—All fractures, both simple and compound, must be set properly, *i. e.*, the broken portions must be brought in their proper relation with the rest of the limb, before a cure can be effected. As a general rule, it is better not to attempt to set a fracture until everything is ready and at hand for its final treatment, or "putting up;" but when a piece of bone is seen to have taken up such a position that any slight movement of the patient may force it through the skin, it will be better to make traction at once, restore the piece, if possible, to its proper place, and keep up extension while the necessary apparatus is being prepared. In thus effecting extension, one assistant should grasp the limb firmly above the injury and another below it, and both should then make steady traction in opposite directions until reduction is effected, of which the house-surgeon will judge partly by the restoration of the symmetry of the limb, partly by carrying the finger along the most prominent portion of the bone to ascertain its regularity, as well as by comparison with the other limb and careful measurements.

In making comparative measurements of limbs, great care must be exercised to take precisely the same fixed points on the two sides; and an ordinary measuring-tape is the best instrument for the purpose, since the exact measurement of each side can be at once read off and recorded.

The following are the principal points made use of in measuring the limbs:

In the lower extremity—

From the anterior superior spinous process of the ilium to the *lower* border of the patella. (The lower border of the patella should always be selected, and the bone be pushed up as far as the ligament will allow it to go, or error may be caused by the contraction of the muscles of the thigh.)

From the patella to the inner or outer malleolus.

From the anterior superior spine to the malleoli.

In the upper extremity—

From the extremity of the acromion process to the external condyle of the humerus.

From the tip of the coracoid process to the inner condyle.

From the condyles to the styloid processes of the radius and ulna.

Before applying any apparatus, the limb should be cleansed with soap and water; and in hot weather, a little starch powder dusted over the skin will prevent the itching, which may otherwise become intolerable.

Apparatus for fractures.—*Splints* of every possible form have been invented for the treatment of fractures, the greater number of which are never used, at least in hospital practice. Both metal and wooden splints are in common use, and the ordinary ones will be indicated in the following pages, in describing the treatment of the individual fractures. Both kinds must be carefully selected so as to fit the limb accurately, and should be carefully padded before being applied.

Pads may be made of tow, cotton wool, or sheep's wool, the advantage of the latter being its greater elasticity. The material chosen should be carefully packed together so as to fit the splint and slightly overlap its edges, and should then be enclosed in a piece of soft cloth or muslin, which may either be made to wrap round the splint and pad together, or enclosing the pad alone, may be afterwards stitched to the splint, according to the fancy of the surgeon. Care must be taken to prevent the stuffing of the pads becoming lumpy and uncomfortable, and, in making large pads which will be subject to continual pressure for some weeks, it will be advisable to have the thread carried *through* them at a few points, so as to prevent the shifting of the stuffing.

Very sufficient *extempore* pads may be made for the use of out-patients, by wrapping some tow or wool in a piece of muslin or lint, and then fastening it to the splint with a strap of plaister at each end.

Splint-room.—Every hospital is, or should be, provided with a room specially fitted to contain surgical appliances. It should be fitted with cupboards, having shelves long enough to hold full-sized splints, which should be kept sorted and padded ready for use. In order to keep the splints and pads clean, a sheet of unbleached calico should be folded round each division; otherwise the dust gets in, and, when required, the pads have to be re-covered.

All splints should be thoroughly washed before being re-padded; and if employed for gangrenous cases, &c., they should be repainted if made of iron, or scraped if of wood, before being again used.

Gutta percha is a most useful material for splints, and for this purpose its thickness will vary from an eighth to a quarter of an inch, according to the amount of support required. To use this substance effectively one or two minor precautions are necessary; the first of which is that the piece of gutta percha should be cut an inch or two larger every way than the size of the splint required, since the gum undergoes contraction upon being immersed in hot water. A basin or pan, sufficiently large to take the piece of gutta percha without bending should be provided, and *boiling* water will be necessary for its preparation. It will save scalding the fingers, and also maintain the shape of the splint better, if the gutta percha be laid upon a piece of muslin of suitable size, by which it can be immersed in the water, and held there until perfectly softened. Being then lifted out by means of the muslin, it should be allowed to cool for a moment or two, so as not to scald the patient's skin, and must next be applied to the part to which it is intended the splint should be fitted. The wet fingers of the operator should then mould it carefully to the limb, and afterwards a bandage had better be applied so as to maintain it in position until cooled. In a quarter of an hour the splint may be removed, and any roughness of the edges trimmed off with a sharp knife, when it may be padded with wool, or lined with wash-leather plaister, and will be fit for use. In order to obviate the unpleasant confinement of the perspiration which the gutta percha causes, it will be advisable to make a series of holes in the splint, when perfectly cold, with a punch of the diameter of an eighth of an inch or more; and if the splint is lined with leather, it should also be perforated in the same way.

In fitting a gutta percha splint to a case of fracture, care must be taken to bring the parts into the exact position they are intended to occupy eventually, before the gutta percha cools, or the mould will be useless; and in some cases, therefore, it will be better to shape the splint upon the corresponding portion of the sound limb, and afterwards make any little alteration which may be necessary for the opposite side.

Leather.—Thick sole-leather may be used for making splints, being cut to the appropriate shape with a sharp knife, and then softened in hot vinegar and water before being moulded to the limb, in the same way as the gutta percha, over which it has the advantage of not interfering with the functions of the skin, but is otherwise not so manageable as the gum.

On an emergency, very serviceable splints may be improvised out of cardboard, an old hat-box, or even an old hat itself.

Immoveable apparatuses.—Under this head I shall describe the mode of applying bandages to which certain adhesive substances are added, with the view of fixing them firmly upon a limb, and encasing it, so as to form a most useful method of treatment in almost every variety of fracture.

The substances in most common use among British surgeons are—1st, starch; 2nd, a mixture of chalk and gum; and 3rd, plaster-of-Paris. Of these the starch is, perhaps, the most extensively employed; but the plaster-of-Paris bandage possesses, in my opinion, such decided advantages over it, that it will eventually almost entirely supersede the starch, as the method of using it becomes more generally known.

Starch bandage.—The starch is mixed in the ordinary way with warm water, and is to be of the consistency of that used by laundresses. The limb being held in a suitable position by assistants, the usual practice is to apply a dry bandage over the whole length of it. The starch is now to be painted with a brush over the bandage, and made to soak into its interstices; and any inequalities are to be filled in with cotton wool, soaked in the starch. Strips of pasteboard, of a suitable size and shape, and well soaked in the starch, are then to be laid along the limb, in the positions in which support will be principally required; and lastly, a well-starched bandage is to be applied two or three times over all.

Owing to the amount of moisture necessarily included in this apparatus, it will take many hours to dry, and the limb must therefore be carefully maintained in position by means of sand-bags, and, if necessary, by extension with a bandage. When the starched case is dry, it is customary to lay it open with a pair of strong cutting pliers, in order to see that the limb is in proper position, and a fresh-starched bandage is afterwards applied over the case to restore its continuity. If the limb should have been swollen when the bandage was first applied, in three or four days the starched case will be found to be too large, owing to the natural subsidence of the swelling; and it will be necessary to split open the case again, and, having pared the edges to the requisite amount, to re-apply it with a fresh external bandage.

The great difficulty in using this apparatus will be found to be the dangerous and unbearable constriction of the limb, caused by the shrinking of the first dry bandage. This, I believe, may be advantageously dispensed with altogether; or, if employed, care should be taken to use a bandage which has been washed and thoroughly shrunk, and this precaution will be as well for all the bandages used with the starch. M. Seutin avoids the use of the first dry bandage, by employing cotton wool smeared with starch, in which the limb is wrapped, and this has the advantage of becoming compressed by the contracting bandages outside it, and thus guarding the limb from injurious pressure. The house-surgeon must exercise the most vigilant care, for the first forty-eight hours after applying the starch bandage, that no such pressure occurs, and must not scruple to cut the whole apparatus away, if the extremities of the limbs show the least symptom of it, or if the patient complains of feeling great constriction.

Chalk-and-gum bandage is applied in exactly the same way as the starch bandage. The adhesive mixture is made by adding boiling water to equal parts of gum arabic and precipitated chalk; and this material has the advantages over the starch, both of becoming firm sooner, and of having more strength, so that the addition of strips of pasteboard is rarely necessary.

Plaster-of-Paris bandage.— The plaster for this purpose should be the fine white powder used by modellers; and must not be old, or it will have become deteriorated by the absorption of moisture.

There are two ways of applying the bandage.

First method.—Taking a loosely woven bandage (the 'lint bandage' of Mr. Ewen is admirably suited for the purpose), the dry powder is to be rubbed into its meshes on both sides with the palm of the hand, and the bandage is then to be loosely rolled. These powdered bandages may be kept rolled and always ready, if they are preserved in a covered jar so as to exclude the air. When required, the bandage should be placed in a basin of water for a couple of minutes, that it may become thoroughly wetted, and should then be applied as rapidly as may be upon the fractured limb, which must be carefully held by the assistants. The bandage may be applied directly upon the skin, and, as far as possible, 'reversed turns' should be avoided, but each fold of the bandage should thoroughly overlap the one below. The bandage should be long enough to go once up the limb and then down again; and it will materially strengthen the casing if the operator has a little of the plaster mixed with water to the consistence of cream, by his side, and applies some of it with the palm of the hand between the two layers. If the interior of the bandage should not have been sufficiently wetted, it can be readily dipped into the basin again, and a little of the fluid plaster applied over all will fill up any irregularities.

Second method.—If the powdered bandages are not already prepared, the following will be the readiest way of applying the bandage. Some cold water being placed in a basin, the plaster is to be shaken in, and the water well stirred until it becomes of the consistence of cream; then the bandage, being placed in another basin of water, that it may become wetted as it unrolls, the operator is to commence rolling it *in* the basin containing the plaster, which will thus become effectually applied to its surfaces. The bandage will be applied to the limb in the manner described above, and some of the mixed plaster can be used to fill up the interstices.

When the surface to be covered with the plaster bandage is very extensive, it may be advisable to delay the setting of the plaster, by the addition of a very small quantity of size to the water; or if that is not at hand, a little stale beer will answer as well. The addition of salt to the water *increases* the rapidity with which the plaster sets.

In whichever way the bandage is applied, the assistant who is holding the limb should maintain his hold for five minutes after the operation is completed, when the plaster will be sufficiently set, and will only require time to dry.

The day after the application of the bandage, when it has become dry, the surface should be painted with gum-water, white of egg, or what is much cheaper, common flour paste, which will prevent the plaster from chipping; and in children or imbeciles, when the bandage is likely to be wetted with urine, a coat of spirit varnish over the exposed surface of the limb will prevent all damage, and materially assist in maintaining cleanliness.

The great advantages which the plaster bandage possesses over the starch and gum are, the ease with which it can be applied, and the rapidity with which it acts, thus forming at once a perfect case for the limb, and obviating the necessity for the maintenance of extension during the process of drying. The plaster bandage is readily removed, when done with, by simply unwinding it, whereas the operation of cutting open the starch apparatus is always one of considerable difficulty.

Plaster-of-Paris Splint.—The following is another mode of using the plaster so as to form a regular splint for the limb, which can be removed and reapplied at pleasure. The description is that given by Dr. Little of New York:

The limb is first shaved or slightly oiled; a piece of old coarse washed muslin is next selected, of such a size that when folded about four thicknesses it is wide enough to envelope more than half of the circumference of the limb, and long enough to extend from a little below the under surface of the knee to about five inches below the heel. The solution of plaster is then to be prepared. Equal parts of water and plaster are the best proportions, and the plaster is sprinkled in the water and gradually mixed with it. The cloth having been unfolded, is immersed in the solution and well saturated; it is then to be quickly folded as before arranged, and laid on a flat surface, such as a board or a table, and smoothed once or twice with the hand in order to remove any irregularities of its surface, and, with the help of an assistant, applied to the posterior surface of the limb. The portion extending below the heel is turned up on the sole of the foot, and the sides folded over the dorsum, and a fold made at the ankle on either side. A bandage is to be applied pretty firmly over all, and the limb is then to be held in a proper position (extension being made if necessary by the surgeon), until the plaster becomes hard. The time required in preparing the cloth, mixing the plaster, and applying the casing to the limb, need not take more than fifteen minutes. After the plaster is firm, and the bandage removed, we shall have a solid plaster-of-Paris case partially enveloping the limb, leaving a portion of its anterior surface exposed to view. If any swelling occurs, evaporating lotions can be applied to the exposed surface, and we can always easily determine the relation of the fractured ends. If necessary, an anterior splint, made of the same material, can be applied and then both bound together with adhesive plaster, and, if desirable, a roller bandage over all. If the anterior splint is not used, two or three strips of adhesive plaster, one inch wide, or bands of any kind, may be applied around the casing, and will serve to keep it firmly adjusted to the limb. Thus applied, we have a most beautiful splint, partially enveloping the limb, making equal pressure, light, and allowing the patient to change his position in bed, or to sit up in a chair, or go about on crutches; and a splint which can be easily made in any place where plaster is to be had.

Sand-bags are very useful adjuncts in the treatment of fractures, being laid on each side of the limb, with or without the addition of splints. Care should be taken that the material of which the bag is made is sufficiently fine to prevent the sand from getting out into the bed, and the sand itself should be the finest sea-sand, and thoroughly dried.

CHAPTER X.

SPECIAL FRACTURES.

Fractures of the skull are accompanied generally by the symptoms of either concussion or compression of the brain. When, therefore, the injury to the bone is only slight, consisting merely of a simple depression or crack of the calvaria, with more or less concussion, the house-surgeon may content himself with shaving the head and applying cold to it, conjoined with rest and darkness, unless more urgent symptoms should supervene, when the advice of the senior officer should at once be obtained.

When, however, the injury is complicated by a wound of the scalp, rendering the fracture compound, or if it is comminuted and symptoms of compression are present, no time should be lost in summoning the surgeon of the day, since any operative interference, to be of service, must be early, and even should no operation be requisite, it is but right that, in cases which are always more or less ambiguous, the greatest experience should be brought to bear upon them. The house-surgeon must be careful not to mistake a bruise of the scalp (the margins of which are often so sharply defined as to resemble the edge of bone) for a fracture of the skull with depression. With a little care, it can be satisfactorily made out that the depression is imaginary, and the fluctuation of the blood in the centre of the tumour will assist in the diagnosis. These cases must never be punctured, and only require time for the due absorption of the effused blood.

Fractures of the base of the skull may give rise to no special symptoms at first, and be only detected by the flow of clear fluid from the ear after the patient is placed in bed. Perfect rest in the recumbent position is the best method of treatment, followed by the exhibition of mercury should acute head-symptoms supervene.

Fractures of the spine are generally complicated with serious damage to the spinal cord, producing paralysis of the parts below the seat of injury, or, if very high up, causing immediate death by cutting off the nervous supply to the diaphragm. Since time is the only possible means of cure for these cases, the house-surgeon's care must be directed to the prevention of bed-sores and diseases of the bladder, by placing the patient upon a water-bed from the first, and by drawing off the urine at frequent intervals, and washing out the bladder at least once a day (*vide* p. 63).

Fractured pelvis, resulting from a severe crushing force, or a fall from a great height, is but too often complicated with rupture of some of the abdominal viscera, and especially the bladder. The house-surgeon's first care must therefore be to introduce a catheter and draw off any urine which the bladder may contain, and the condition of which, bloody or otherwise, will help to the conclusion as to whether that viscus is injured or not. Bloody urine, though alarming, is by no means a certain sign of rupture of the bladder, since it may simply be caused by a bruise of the kidneys, bladder or urethra (*vide* p. 23 for diagnosis). The most certain sign of rupture of the bladder is when *no* urine can be drawn off by the catheter, while it is shown by the history of the case, that the bladder must have contained a considerable quantity at the time of the accident. If, as generally happens, the urine has passed into the peritoneal cavity, nothing can save the patient; but if, fortunately, the rupture may have taken place in front of the membrane, it is just possibly that timely incisions might do good, and the visiting-surgeon should therefore be summoned to see the case.

Rupture of the urethra is occasionally caused by fracture of the pubic portion of the pelvis, and will possibly impede the passage of the catheter into the bladder, or subsequently give rise to extravasation of urine (*q. v.*).

Treatment.—Absolute rest being necessary, it is advisable to put the patient upon a fracture-bed, so as to avoid all disturbance when the bowels are relieved, &c. A broad strip of leather plaister may be fastened round the pelvis to keep the fractured portions in position, and, where the injury has comminuted the anterior part of the bone, the finger should be introduced into the rectum (or vagina) to restore the fragments as nearly as possible to their proper position.

Occasionally the whole acetabulum of one side is detached by a double fracture, and consequently is pushed up by the contraction of the muscles of the thigh, and it will then become necessary to make extension by means of a long splint, which will take its point of counter-extension from the opposite thigh, by means of a fillet similar to that recommended for the treatment after excision of the head of the femur, by Mr. Fergusson ('Practical Surgery,' p. 464).

Fractured nasal bones should be restored at once to their proper position by means of a probe introduced into the nostril, and will generally keep in place without any plugging of the nostrils, provided the patient exercises ordinary care. These fractures are not unfrequently accompanied by emphysema of the tissues about the root of the nose and eyelids, which may possibly be mistaken for commencing erysipelas. The best treatment is to paint the part with collodion, which, if repeated a few times, will exercise pressure sufficient to prevent further escape of air into the tissues.

Fractured lower jaw, in hospital practice, is generally the result of a blow with the fist, and seldom of a fall, though the patient may assign the latter as the cause of the accident. Care should be taken to examine all the teeth, to see that a tooth has not dropped into the fissure between the broken portions, as sometimes happens, particularly in the molar region.

If the fracture is near the symphysis, it is advisable to pass a piece of stout silk round the adjacent teeth, so as to bind the fracture together, but this cannot be accomplished far back in the mouth. The wedges of cork, &c., which are recommended, are, as far as my experience goes, unnecessary and useless, since they cannot long be kept in position, and then roll about the mouth, to the patient's great annoyance. It has been recommended to mould pasteboard or gutta percha to the jaw externally, so as to form a splint for it, but in the majority of cases the following bandage alone will be found quite sufficient and satisfactory treatment.

A bandage, three inches wide and a yard long, should have a slit four inches long cut in the centre of it, an inch from the edge, and the ends of the bandage should be split to within a couple of inches of the former slit, thus forming a four-tailed bandage with a hole in the middle. The central slit can now be adapted to the chin, the narrow portion going in front of the lower lip and the broader beneath the jaw; and the two tails corresponding to the upper part of the bandage are then to be tied round the nape of the neck, while the others are crossed over them and carried over the top of the head.*

Fractured ribs are often very difficult of accurate diagnosis, especially if the patient is fat; and in cases of doubtful injury to the thorax, it is as well, therefore, to apply a broad flannel bandage at once, which generally gives great relief.

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* *Vide* illustration, Druitt, p. 236.

When a fracture can be clearly made out, the application of a broad piece of plaister from the spine to the sternum of the affected side will be the best treatment, since the movements of the sound side are thereby less interfered with than if the bandage is used.

Cases of injury to the thorax, by crushes, &c., with or without fractured ribs, are materially relieved from the consequent dyspnœa by small doses of tartar emetic given for a day or two after the accident.

Fractured clavicle.—More forms of apparatus have been contrived for the treatment of this fracture than for any other, but the following are the two methods most in use in hospital practice.

A pad being placed in the axilla of the affected side, a figure-of-eight bandage is taken round the shoulders and behind the back; wool being carefully adapted to prevent rubbing at the axilla. The shoulders being thus drawn back, the arm is fastened to the side by a few turns of bandage, being at the same time pushed outwards by the axillary pad, while the forearm is carried in an ordinary sling.*

The disadvantage of this arrangement is the uncomfortable drag of the bandage behind the shoulders, which is very irksome to the patient, unless he continues in the horizontal position.

In the second method, a firm pad three inches thick at the upper part, but diminishing to an inch at the lower end, which should be half-way down the humerus, is to be fastened into the axilla of the affected side by means of a piece of bandage stitched to it and tied over the opposite shoulder. A bandage being taken twice round the middle of the humerus, so as to get a firm hold, is then to pass *behind* the body, and a few times round the chest, enclosing the humerus and binding it firmly to the side and in a vertical direction (fig. 38). (The bandage is directed to be taken across the back first, to counteract the tendency there is to cross the humerus over the chest.) The forearm, being now laid across the chest with the hand towards the opposite shoulder, is to be enclosed in a regular series of turns round the body, a few of which should be made to pass under the elbow and over the opposite shoulder, so as to keep the arm from dropping down.

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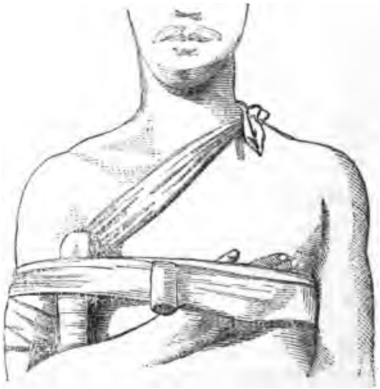
* *Vide* illustration, Druitt, p. 237.

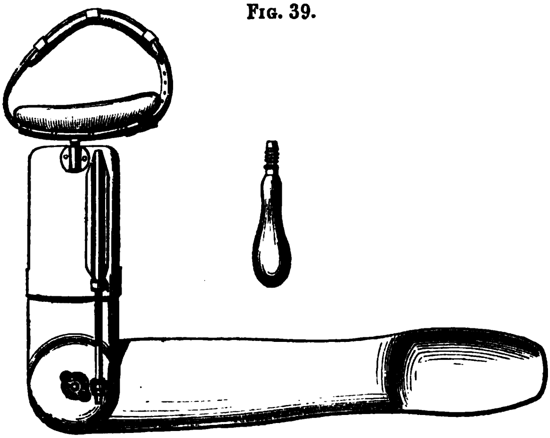
FIG. 38.



To keep the apparatus firm, the bandages should be carefully stitched both along the front and back of the axillary pad and around the elbow; or if the surgeon choose he may add plaster-of-Paris or starch to the above arrangement, and so thoroughly fix the parts.

Fractured humerus.—If the fracture is near the upper extremity of the bone, it may be conveniently treated with a rectangular iron splint, to which a crutch is fitted, with a screw so as to permit of extension being made in the axilla (fig. 39). In using this it will be necessary to bandage the forearm and lower part of the humerus carefully to the splint, before the screw is turned, and care must be taken not to press the crutch so forcibly into the axilla as to produce œdema of the limb. This splint is sometimes fitted with a cap to pass over the shoulder and along the outside of the humerus, which may be used or not, at the fancy of the surgeon.

Fig. 39.



Another method is to place only a pad in the axilla, and then to mould a firm gutta-percha splint to the shoulder and outside of the arm as far as the elbow. The bone is then carefully bandaged to the outside splint, and the pad prevents dislocation inwards. The arm should subsequently be confined to the side of the chest by a roller, the forearm being flexed and carried in a sling; and plaster-of-Paris or starch may be advantageously used to keep the parts firmly in position.*

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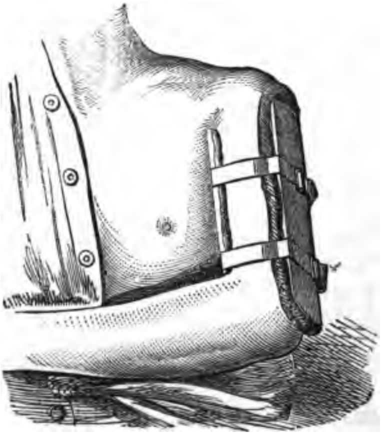
* *Vide* illustration, Fergusson, p. 262.

Fractures of the shaft of the humerus may be conveniently treated with three straight splints, which can be easily cut to the length required for each case. The forearm being flexed, one splint is placed on the inside of the arm, reaching from the axilla to the inner condyle; and care must be taken that the pad a little overlaps the splint at the upper part, or it may excoriate the armpit. A second longer splint is placed on the outside of the arm, reaching from the acromion to the external condyle; and a third (or fourth, if necessary) may be placed in front or behind, between the other two. These may be bandaged to the arm; or, as shown in the illustration (fig. 40), a couple of linen straps and buckles may be used. The forearm may be placed in a sling, taking care that the elbow is not pushed up, or the whole arm and forearm may be covered with a bandage passing round the thorax.

FIG. 40.

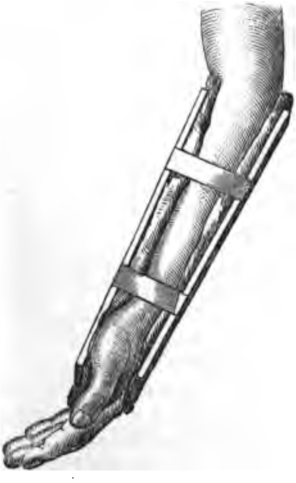


A rectangular splint on the inside alone, or on both sides of the arm, and reaching to the wrist, may be used, care being taken to pad thickly near the condyles; or what is better, to have a hole cut in the splint to fit the projecting bone. The straight splints, figured above, may be conjoined with the rectangular inside splint, or the plaster-of-Paris bandage alone may be employed.

Fractures at the lower end of the humerus are best treated with an inside rectangular splint; and when the injury involves the elbow-joint, care should be taken that it is not injuriously compressed by the bandages; and, in fact, it is better to avoid taking the bandage over the joint at all, so as to allow of the application of fomentations or evaporating lotions, if necessary.

Fractures of forearm.—The treatment will be the same, whether the shaft of one or both bones of the forearm is fractured. Two light wooden splints are

Fig. 41.



ordinarily used; but surgeons differ as to their length, some carrying the splints to the tips of the fingers, while others make them reach only to the wrist. It will, I believe, be found most satisfactory to have the splints long enough to reach to the metacarpal bones, so as to prevent motion in the wrist-joint, but not to interfere with the movements of the fingers (fig. 41). Care should be taken, in selecting the splints, to have them very little wider than the limb itself—only enough in fact, to take off the pressure of the bandage, since otherwise the limb will roll about between the splints, and a very indifferent cure will be effected.

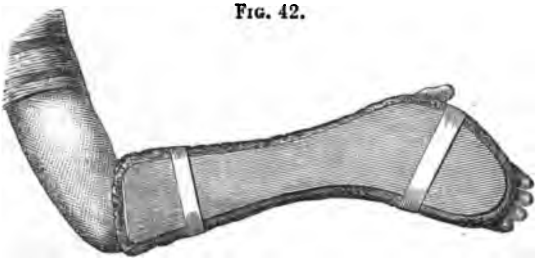
The splint for the front of the arm must be a little shorter than the other, to allow of the elbow being easily flexed; and in padding the splints, care should be taken to make the stuffing rather thicker in the centre than at the sides.

Although the position which the arm will ultimately assume will be between pronation and supination, in setting the fracture and in first applying the splints, the limb should be supinated, by which step the bones will be brought parallel to one another. Having satisfied himself that the broken bones are in proper apposition, the house-surgeon should then gently lift the limb on to the back splint, and lay the front one upon it; next, grasping the two ends of both splints firmly, he should bring the arm into a position midway between pronation and supination, and hold the splints while an assistant passes a strap of adhesive plaister around each end of them, so as to fix them securely (fig. 41). By thus avoiding all muscular action on the part of the patient, the chances of displacement are greatly diminished, and the bones will probably be in much better position than if the splints are put on after the rotation has been made. A bandage can afterwards be applied over the splints, and the arm suspended in an ordinary sling.

A single splint is sometimes made use of; and in that case the hand is generally pronated, and the splint is carved to fit the wrist and metacarpal bones.

Colles' fracture.—For the treatment of this fracture of the lower end of the radius, it is necessary that the hand should be adducted; and for this purpose such a splint as is shown in the illustration (fig. 42), or a more perfectly pistol-shaped one, as preferred by some surgeons, may be employed. The practice varies as to which side of the limb the splint should be applied to; most surgeons, however, preferring the palmar aspect. In applying the splint, the limb should be firmly grasped, and the hand adducted until the bones come into proper position, when the splint may be applied to the palmar surface, and held there, while a strap of plaister is applied around the hand, and another round the upper part of the forearm, to keep the limb in the necessarily strained position. A bandage should afterwards be applied over the hand and at the upper part of the forearm, but not over the seat of fracture, as it would tend to displace the broken ends.*

FIG. 42.



Fractured metacarpal bones.—If one of the central metacarpal bones is broken (generally in fighting), it will be most efficiently treated by placing a stout ball of tow in the palm, and then flexing the fingers forcibly upon it, until the fracture is reduced, when the hand must be retained in position by bandaging the fingers firmly down to the wrist, the metacarpal bones being left uncovered. If one of the lateral bones or that of the thumb is broken, a palmar splint, of either wood or gutta percha, and thickly padded, may be employed; and it may be necessary to flex the fingers over the top of the splint, before the broken bone can be properly adjusted.

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* *Vide* illustration with pistol-splint applied to the dorsal surface. Erichsen, p. 237.

Fractured phalanges are readily treated with a splint of wood or gutta percha, and a bandage similar to that figured for the finger (p. 133). It will be found convenient to pad the splint by wrapping it up in a suitable piece of lint, two or three times folded; and it will be best to make it long enough to reach well into the palm of the hand.

Fractured thigh.—The long splint, with a perineal band, is one of the commonest modes of treatment of fracture of any part of the femur. In applying it, care must be taken to select a splint long enough to reach from the lower part of the axilla to a few inches beyond the heel, and that in children the splint is not wider than the thickness of the limb, or it will be impossible to prevent the thigh from rolling beneath the bandage. A useful addition to the long splint is a small wooden cross-bar fastened below the splint and a few inches from its lower end. This both obviates injurious pressure upon the patient's heel and prevents the rolling of the limb to one side, and is therefore a great assistance especially in cases of hip-disease. In some hospitals, Desault's splint, with a foot-piece, is preferred to the plain lath commonly known as Liston's splint.

The perineal band is a most important part of the apparatus, and is best made of a piece of soft cotton bandage stitched so as to form a long narrow bag, and then stuffed with cotton wool. This should be long enough to reach from the middle of the groin to the corresponding point behind, and to each end of it should be attached stout tapes, which will work much more easily through the holes in the top of the splint than any bandage. It has been recommended to cover the perineal band with oil-silk; but it will be found that the perspiration, to say nothing of the urine in the case of children, will soon cause the oil-silk to fray out and excoriate the groin. If it is desired to use some waterproof material, the thin india-rubber cloth will be found to be the best.

To apply the long splint.—The splint having been carefully padded, and the perineal band prepared, the house-surgeon should envelope the ankle in cotton-wool, and then make two or three figure-of-eight turns with the bandage around it, so as to get a firm hold on the foot. Then placing the splint by the side of the limb, the bandage is to be carried around its lower end, and through the notches cut for the purpose, so as to fix the foot; great care being taken to insert cotton wool wherever there is any pressure, and to avoid crushing the smaller toes against the splint. The bandage is then carried regularly up the leg; and it will be found that the figure-of-eight method can be advantageously used all the way, without any 'reversed turns,' the crossings of the bandage being made along the line of the splint. The knee having been included in the bandage (unless the fracture is very low down), the perineal band should be adjusted, and one assistant should then make extension on the foot, while another tightens the perineal band, until the house-surgeon is satisfied, by manipulation and measurement, that the fracture is properly set, and that the limb corresponds with its fellow in length. The tapes of the perineal band should then be carefully tied, and a broad roller must be carried round the thorax to confine the upper end of the splint; but the bandage on the thigh need not be carried any higher, since the seat of fracture is best left exposed.* When the fracture is high up in the shaft, some surgeons prefer to add a small straight splint to the above, placing it over the fracture, and securing it with a couple of straps and buckles; others again employing, in all cases, three splints to surround the thigh, in addition to the one on the outer side.

A sand-bag laid along each side of the limb will help materially in keeping the limb quiet; and, in children or unruly patients, it will be well to fasten a broad bandage or sheet over the thighs and trunk, so as to prevent attempts at sitting up, &c. In very young children, it will very much relieve the irksomeness of the confinement, if a hole is cut in the bandage or sheeting, through which the *sound* leg can be kicked about as much as may be desired, without detriment to the fractured limb, which may, for additional security, be fastened by a bandage to the bottom of the bed.

The constant wetting of the bandages with urine is a great drawback in the treatment of children, and may be best combated by smearing the upper part of the thigh bandage with plaster-of-Paris and afterwards varnishing it, and by changing the perineal band occasionally, unless made of india-rubber cloth.

Plaster-of-Paris or starch may be advantageously used, from the first, without splints, and no special directions need be given for their application; or they may be added to the long splint, so as to prevent all possibility of movement.

Double inclined plane, if used, may be formed of an ordinary MacIntyre iron splint, screwed to the proper angle; or, what is preferable, a wooden stand made to fit the bed, on which a double incline can be at once made to any height, may be employed. Most forms of fracture-bed allow of this position being assumed, and in cases of severe compound injury, or fracture of both limbs, recourse may be had to that method of treatment at once.

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* *Vide* illustration, Fergusson, p. 400, or Druitt, p. 252.

Extension by straps of plaister.—The practice of making extension by means of straps of adhesive plaister having come into vogue in America, it has been adopted by some surgeons in this country, and has the advantage of obviating injurious pressure about the ankle. A strip of plaister, two inches wide, is cut long enough to reach from immediately below the knee to the sole, and up again on the opposite side of the limb, leaving a loop, eight or ten inches long, below the foot; this is carefully applied to the limb, a bandage is carried over it, so as to prevent any possibility of its slipping, and the loop is then twisted into a sort of rope with a small noose at the end. (If desirable, a piece of wood or gutta percha may be placed across the sole of the foot, to prevent its being pressed upon by the twisted plaister.)

The loop at the extremity of the plaister, which, it will be observed, exercises traction without compressing the ankle, may be secured in one of the notches of the ordinary long splint; or extension may be produced without a splint, by attaching a weight to it, which may hang over the end of the bed. An American mode of making extension is by using a long splint with a perineal band, and a crossbar going below the sole of the foot. The limb is not bandaged to the splint; but extension is produced by a loop of plaister, which is acted on by a tourniquet, or some similar contrivance, attached to the cross bar, and thus any degree of extension can be made.

Fractured patella.—In treating this fracture, the great point is not to put on any apparatus too soon. The knee-joint must have been injured to a certain extent, and will require rest, cold lotions, &c., for some days, before a bandage can be applied. The portions of bone should be approximated as closely as possible, by relaxing all the muscles of the limb, by making the patient sit up in bed, and raising the whole limb to a convenient height on pillows or a leg-rest.

When all inflammatory action in the joint is past, if the patient is kept in bed, a simple splint at the back of the knee, with two straps of plaister to hold the fragments together, will answer very well; or Wood's splint may be employed, which is merely a back splint with hooks put into it, to give fixed points for the bandage to act from, and so to drag the parts together.* A broader splint than the common ones will be best for this purpose, since thus all pressure on the sides of the knee-joint will be avoided; and it is well to bandage the thigh carefully from above downwards, so as to counteract the action of the extensor muscles.

Plaster-of-Paris and starch are particularly applicable to the treatment of this fracture when all active mischief has disappeared, and either of them may be applied alone, or in conjunction with a light wooden splint at the back of the knee. This latter method has the great advantage of enabling cases to be treated as out-patients much earlier than would otherwise be possible.

Fractured tibia may be treated, from the first, most satisfactorily with the plaster-of-Paris or the starch bandage.

MacIntyre's iron splint is a good but rather cumbersome method of treatment, and, unless care is taken to have the splint no broader than the limb, it is apt to shift to one side as the patient moves in bed. The splint should be slightly flexed at the knee (by means of the screw beneath), and the foot-piece made of a suitable length, and placed at rather more than a right angle to the leg-piece. It is usual to fasten a piece of bandage to the splint which is intended to go beneath the heel; but this will generally be unnecessary, if the foot is properly secured to the foot-piece, and it is rather apt to rub the patient's skin.

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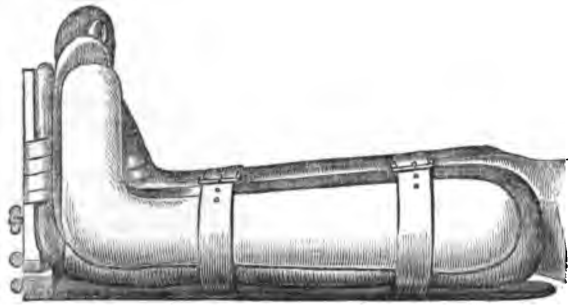
* *Vide* illustration, Fergusson, p. 393.

A turn or two of bandage having been made around the ankle in order to fix the roller, and the foot having then been secured to the splint, some cotton wool should be inserted between the malleoli and the side of the splint, to prevent any rubbing at those points; and the fracture being in proper position—the best criterion of which is that the great toe is in a line with the inner border of the patella—the bandage can be carried round the splint and as far up the leg as may be deemed necessary. Another roller around the thigh and upper part of the splint will complete the arrangement, which can be rendered infinitely more comfortable to the patient by swinging the whole limb either to an ordinary cradle or to a Salter's swing, which allows of more extended movement on the patient's part, and gives great facilities for dressing compound fractures, &c.*

In many hospitals three splints are employed for all fractures of the tibia, the back one being a straight splint reaching to the ham, with a foot-piece at right

FIG. 43.



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* *Vide* illustration, Fergusson, p. 391.

angles, and the side splints having foot-pieces also to pass on each side of the limb. In applying it the foot is secured to the foot-piece in the ordinary way with a bandage, which is only carried up to the ankle, another being used to confine the limb to the splint above, and applied immediately below the knee. The side-splints are best attached by linen straps and buckles, so that they can be readily taken off, if necessary (as in dressing a compound fracture), and the whole limb can be swung in the manner recommended above.

The whole arrangement is shown in the accompanying illustration (fig. 43), from a sketch of an actual patient.

Hester's apparatus, which is very effective, and in constant use at the Westminster Hospital, combines the advantages of the above arrangement together with those of the swing, as the splint is suspended from rollers and a cradle, which allow of the free movements of the patient. In making use of it, the knee is first firmly fixed, a pad being placed below the tubercle of the tibia, and another above the head of the fibula; and the foot being well strapped to the foot-board, the whole of the limb is supported by bands of webbing, and thus pressure upon the heel is obviated. Extension is then made by means of a screw underneath, and thus shortening is effectually prevented; whilst the side-splints, when screwed on, keep the limb perfectly steady.

Side-splints alone may be used for fractures of the tibia, and the limb may be kept straight and in a swing, or be semi-flexed and laid upon its outer side. The latter method is the ordinary treatment for simple fractures of the tibia in some hospitals, and the flexed position is found to relax the muscles very efficiently, and to permit of proper coaptation of the broken ends more readily than any other plan of treatment. A bandage is not necessary in this method; the splints being sufficiently secured with straps and buckles, and the limb being laid upon a pillow with the knee bent.

Side-splints are sometimes made with the toe-piece on one side cut off, but there seems to be no rule as to which side of the foot the truncated splint should properly go upon, and it will generally be found more convenient to have the two splints of the same shape.

Fractured fibula.—If the fracture is at the upper part, where the displacement will be slight, the plaster-of-Paris or starch bandage will answer every purpose, or the limb may be put up in side-splints with the leg extended.

When the fibula is broken towards the lower end (Pott's fracture), with or without dislocation of the foot and fracture of the inner malleolus, Dupuytren's short splint should be used, and in applying it two or three cautions are necessary. In the first place, it is to be applied on the *tibial* side, so as to draw the foot in that direction, with the view of throwing the broken ends of the fibula outwards. The efficacy of the splint depends, secondly, in a great degree, upon the pad, which is to be made very thick opposite the point of injury, but thin in the other parts—only sufficient, in fact, to protect the limb from pressure. The foot is now to be bandaged firmly to the lower end of the splint, the notches in which will allow of considerable traction being used; and the bandage is to embrace the malleolus, but not to go more than an inch above it. The thick pad being now carefully inserted between the limb and the splint, immediately opposite the point of injury, another roller is to bind the top of the splint firmly to the tibia, immediately below the knee, but is on no account to be prolonged to the point of fracture.*

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* *Vide* illustration, Druitt, p. 260.

Fractures of the foot are generally the results of a severe crush, and need no special mention here. The os calcis is occasionally broken across by falls upon the heel, and the treatment is the same as that for ruptured tendo Achillis (p. 41).

CHAPTER XI.

DISLOCATIONS.

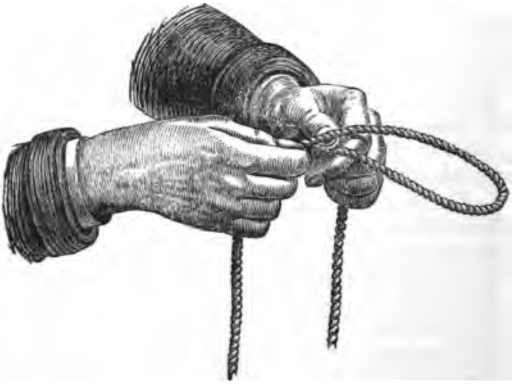
The dislocations which ordinarily come under the house-surgeon's care are those of the upper extremity; those of the lower being of very much less frequent occurrence, and for that reason, as well as for their greater severity, being usually referred to the visiting surgeon.

The existence of a dislocation will be evidenced by the deformity produced in the joint, the ordinary shape of which will be materially altered, while the extremity of the displaced bone will form an unusual projection in the neighbourhood of the articulation. The limb will have assumed an unusual position, in which it will be fixed unless the dislocation should happen to be complicated with a fracture of the shaft of the bone, in which case there will be an abnormal amount of motion in the lower part of the limb, while the upper part will remain fixed and distorted. In recent dislocations there will be no sensation of crepitus; but in old cases there may be a spurious form of it present, resulting from effusion in the neighbourhood of the joint. Dislocations may be simple or compound, and may be conjoined with fractures either of the articulation or of the shaft. Compound dislocations, being accidents of great severity, in which the question of immediate operative interference will be involved, should be referred without delay to the visiting surgeon. In cases of dislocation with fractures of the *shaft* of a bone, the fracture should be set and put up firmly in splints, &c., and the dislocation immediately reduced; but dislocations with fractures of the articulation must frequently be left in their abnormal position.

Simple dislocations can be reduced, for the most part, without any mechanical assistance, and often without the administration of chloroform, though that drug must always be resorted to at once if any difficulty should be encountered from muscular resistance. If the pulleys are obliged to be resorted to, care should be taken to have a good fixed point to which they may be attached, and to protect the limb from injury during their action.

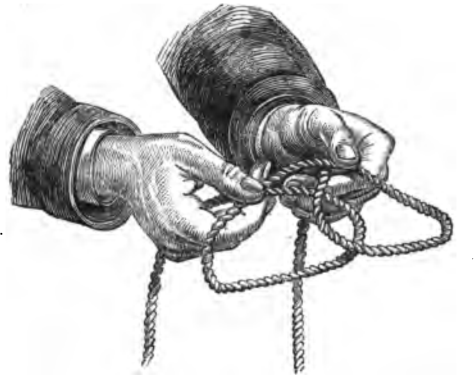
The clove-hitch is the knot ordinarily employed to obtain a firm hold of the limb, and may be made of stout bandage or, what is better, a stout skein of worsted, which not only takes a better grasp of the limb, but is less likely to inflect damage upon it than a bandage or rope. To make a clove-hitch the operator grasps the worsted with his left hand, and forms a simple loop in it with his right, as shown in fig. 44,

FIG. 44.



where a cord is employed for the sake of greater distinctness. Holding the first loop with the left thumb, he then makes another similar loop, and grasps it with his right hand, and finally by passing the one last made beneath the other, the clove-hitch is completed (fig. 45). The hitch is easily slipped over the limb to the required point, which should be protected by a few turns of a bandage around it, and the hook of the pulleys can then be attached to the other end of the worsted loop.

FIG. 45.



There is some difference of opinion as to the point on which traction should be made, some surgeons preferring the extremity of the dislocated bone, while others attach the pulleys to the extremity of the limb in order to gain additional leverage. It will be found, however, in most cases best to apply the clove-hitch on the end of the dislocated bone itself, since by that means all possibility of injuring the intervening joints is avoided.

Dislocated jaw, indicated by the widely gaping mouth if the dislocation is double, or by the chin being thrown to the opposite side if one condyle is displaced, is readily reduced by passing the thumbs, protected by a towel, along the molar teeth to the angle of the jaw, and then forcibly depressing that portion of the bone, when the bone will be immediately drawn into its proper position by the contraction of the muscles of mastication.

Dislocation of the acromial end of the clavicle is not very uncommon, and is readily enough reduced by drawing the patient's shoulders back, while the thumb is pushed against the bone so as to thrust it into its proper position. The difficulty always is to retain the bone in its proper place, and this may be attempted by placing a pad over the point and bandaging firmly through the axilla and round the chest.

Dislocation of the humerus, as ordinarily met with, *i. e.*, into the axilla or beneath the coracoid process, can be reduced most readily with the knee. The patient being seated, the house-surgeon standing by the side, and placing one foot upon the chair, brings his knee into the axilla and bends the arm forcibly over it. Should this fail to effect reduction, or if the dislocation is on the dorsum scapulæ, recourse should be had to the use of the foot, by which method great force can be exerted. The patient being laid on a flat couch or table, the house-surgeon *takes off his boot*, and having laid a folded towel next the skin, places his heel (right or left according to the side dislocated) in the axilla; then having grasped the arm with his hands, makes forcible but steady traction until the bone flies into its place. Should a fair trial of this method fail in reducing the dislocation, chloroform should be administered and the pulleys had recourse to, the scapula being fixed by a jack-towel passed through the axilla and fastened to some convenient point, and the pulleys being attached to the lower end of the humerus by a clove-hitch over a bandage.

After reduction, the arm should be bandaged to the side for a few days, or the accident will very probably recur.

Dislocation at the elbow.—Notwithstanding all the minute directions laid down for the diagnosis and treatment of injuries about the elbow-joint, the house-surgeon will find that he can efficiently treat the great majority of cases by flexing the forearm forcibly upon the upper arm. This can be most conveniently done by placing the knee in the bend of the elbow, the foot being on a chair, and bending the arm round it until the dislocation is reduced, when the forearm can be fully flexed upon the humerus. Should the use of the knee not give sufficient power for the purpose, the foot of the operator may be employed, the patient being seated on the ground, and the operator on a chair in front of him.

It is possible that fracture of the humerus immediately above the condyles may be confounded with dislocation; but the diagnosis will be readily made in a recent example, by noticing that, in the case of a fracture, the condyles move with the radius and ulna, their relative distances being undisturbed, and that the distortion is immediately reproduced, after apparent reduction, when the traction ceases. Should the rapid swelling which usually attend injuries about the elbow render the diagnosis of a doubtful character, it will be better to refer it to the higher authorities, rather than do damage ignorantly to a very important articulation.

Dislocation at the wrist is of rare occurrence, and can be readily reduced by flexion and extension. It is liable to be confounded in young persons with a more common accident, viz., separation of the epiphysis of the radius, the diagnosis depending upon the fact that in the latter case the styloid process can be felt to move with the carpus.

Dislocations of the phalanges made be reduced by flexion and pressure with the fingers in a suitable direction, and it will be generally necessary to employ the clove-hitch, made of a piece of tape, to get a sufficient grasp on the bone. The subcutaneous division of the lateral ligaments, is but rarely required, and if undertaken, the operator should do as little damage to the articulation as possible.

Dislocations of the femur.—The diagnosis and treatment of these dislocations is entered into so fully in all the ordinary works on surgery, that it will be sufficient to indicate here simply the direction in which force should be exerted, in order to reduce the bone, in the forms the house-surgeon is likely to meet with, viz., in dislocation on the dorsum ilii or into the sciatic notch. In either case the operator may place his foot in the groin, and draw the limb downwards and inwards, rotating inwards slightly towards the last. If the pulleys are used, the pelvis must be fixed by a jack-towel passed through the groin, and the extending force applied in the direction indicated above.

As soon as reduction is effected, the patient's thighs should be fastened together, and kept so for some days, to prevent any movement in the joint.

Dislocation at the knee is sufficiently obvious, and is readily reduced; but its after consequences may be serious from injury to the joint or to the popliteal vessels. When reduction is effected, the limb should be placed immediately upon a back splint, to ensure perfect rest, and every means should be taken to prevent inflammatory action in the joint. Attention should be paid to the existence of pulsation in the arteries of the leg and foot, and to any symptom of injury in the popliteal region, since, if rupture of the vessels has taken place, amputation will probably be requisite. Compound dislocations of the knee-joint will very probably require immediate operative interference, either amputation or resection of the articular surfaces being necessary in severe cases.

Dislocations at the ankle-joint, with or without fracture of the malleoli, can usually be readily reduced, and should be immediately put up with side-splints having foot-pieces, so as to prevent all motion in the part.

Compound dislocation at the ankle is an accident always involving the question of primary amputation. If it is determined to save the limb, it may be put up in a MacIntyre splint; or supposing, as is frequently the case, the injury to the skin to be on the tibial side, the knee may be flexed, and the limb laid upon its outer side, and fastened to an appropriate splint.

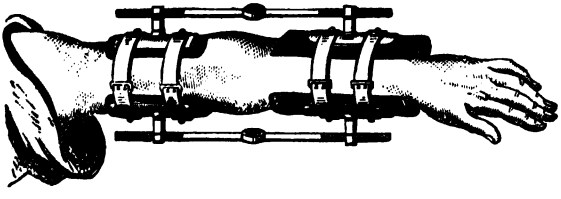
TREATMENT AFTER EXCISION OF JOINTS.

Since cases of excision of joints are always of great interest, each surgeon will naturally give special directions for the treatment of each case according to the particular views he may entertain; and the following are therefore only general hints upon the subject, which may perhaps be of service to the house-surgeon. In the cases of excision where a moveable joint is hoped for, it is of course of no moment that the parts should be kept at perfect rest; but where the firm anchylosis of the articulation is hoped for, as in the knee, it is of the utmost importance that every precaution should be taken to enable the patient to keep perfectly still. With this view it will be advisable in some cases to place the patient, from the first, on a water-cushion, in order to prevent the constant movement of the body which is otherwise unavoidable. Since in these cases also it is unadvisable to disturb the bandages, &c., for some weeks after the operation, considerable difficulty will be experienced in keeping all the dressings thoroughly clean, particularly in hot weather. Creosote will be found useful in preventing flies from infesting a part; but, with all one's care, it is impossible in all cases to prevent maggots forming beneath bandages which are undisturbed for many days in the heat of summer. These animals, though very disgusting, do little harm so long as they do not attack the wound itself, the patient merely complaining of the tickling they produce when crawling on the skin. The patient may be conveniently shielded from flies with a curtain of gauze; but the *papier moure* is rather a nuisance than otherwise near a patient's bed, since, although very destructive to them, it certainly seems to attract the flies in no small degree.

Shoulder. — A pillow, covered with waterproof material, for the arm to lie on, is all that will be required at first. Subsequently, when the patient is able to sit up, the arm must be well supported in a sling.

Elbow.—Surgeons differ very much as to the position in which they place the limb after the operation of excision of the elbow, the rectangular, semi-flexed, and straight positions being employed in different hospitals. A more or less rectangular splint for the fore and upper arm will be necessary for the two former positions, and a straight inside splint, or none at all, is employed for the latter.

FIG. 46.



The accompanying illustration (fig. 46) shows a splint which I contrived for the treatment of cases of excision of the elbow, and which has been used by various surgeons with different results. It consists of four iron plates, which should be well padded, having projecting pieces which are each perforated by a female screw. Two iron rods, with hinges in their centres, and a male screw at each extremity, work in the projecting eyes; and the screws at the two ends being cut in opposite directions, the hinge necessarily remains central, while the plates may be separated to any extent by turning the rods. Before applying the splint the arm should be bandaged above and below the wound, and the plates being attached firmly by means of straps and buckles (additional straps of plaister being used, if necessary), by turning the side-rods the extremities of the bones are separated to the required distance, while, by means of the hinges in the centre, motion can be made with the greatest facility. I have recently modified, and I believe improved the above splint, by adding perforated zinc arm-splints to the iron plates, which embrace and support the upper and forearm, and are padded in the ordinary way. The effect of these is to relieve the pressure around the elbow and to give more support to the limb.

When the arm is at rest in the extended position, the hinges should be turned half round so as to keep the joint perfectly steady; and it is the neglect of this precaution, I believe, which has led to the idea that there is no support afforded to the part. In order to prevent œdema, the limb should not be allowed to hang down—at all events, at first—but should be carefully supported on pillows arranged so as to elevate the arm slightly, without pressing upon the wound at the back of the joint, which should be dressed with strips of lint, long enough to encircle the limb at that point, and thus prevent œdema of the wound.

Wrist may be conveniently treated upon a well-padded splint, on which the hand and forearm may be laid in the prone position.

Hip.—This excision can be best treated with a long splint, interrupted opposite the joint, and bracketed with a light bar of iron. The splint should reach from the foot to the axilla, and be firmly fastened to the trunk, extension being made by means of a rack-and-pinion movement in the splint itself, or by extension from a fillet on the opposite thigh. The distorted position of the limb renders it sometimes difficult to apply any splint properly at first; and this may be reduced by making extension with a weight over the end of the bed.

FIG. 47.

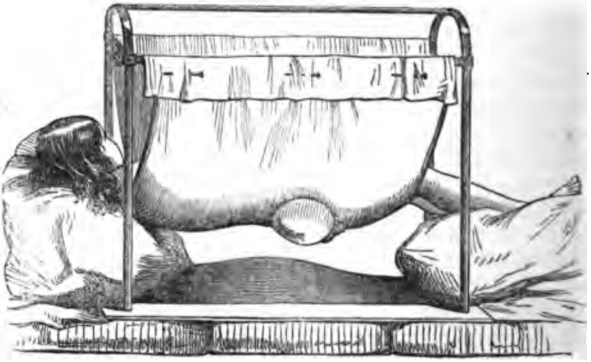


Figure 47 shows an arrangement I contrived for a case of excision of the head of the femur, where the patient was at death's door from the irritation caused by his lying on the wound, which had been carried far back on the buttock, and who made a perfect recovery as soon as he was placed in the "hammock swing." The contrivance was used in the treatment of several cases subsequently; and I find that it has met with some favour among German surgeons, who have also employed the swing in cases of bedsore with advantage; but where the wound is made well at the side of the limb, it is not essential.*

Knee.—A simple, straight splint, reaching from the foot to the back of the thigh, with a foot-piece, is all that is necessary for the treatment of this excision, and may be of either iron or wood. A side-splint with a perineal band, has been added to this by some surgeons with the view of steadying the limb to a greater degree, but it is not at all essential. The splint should be carefully padded throughout, and near the joint the pads should be covered with some water-proof material, to prevent the discharges from soaking into the pads, which it will be impossible to change for some weeks. The practice of swinging the limb in a Salter's cradle has its advantages and disadvantages, the former being the ease it affords the patient in moving in bed without disturbing the joint, and the latter the tendency there is to produce rotation of the limb and inversion of the knee. In the later stages, a well-fitted gutta-percha splint, lined with wash-leather, is the best application.

Ankle.—A simple back splint and foot-piece is all that will be required after this excision, and will leave the wound at the sides of the limb perfectly free for the exit of the discharge.

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* *Vide* 'Lancet,' 3rd October, 1857; and Dr. Fock, in 'Archiv für Klinische Chirurgie,' 1860.

CHAPTER XII.

ON CASE-TAKING.

The careful and systematic reporting of cases is a most important part of a dresser's duty, and the practice thus acquired will be found of the greatest service to the surgeon in after-life. Moreover, in the present day, it is to the house-surgeons and dressers of the various hospitals that we look for the reports of cases of interest which have occurred in their several institutions, and the publication of which is of the greatest moment to the advancement of medical science. In the following chapter an attempt will be made to suggest the general mode of reporting a *surgical* case, and to draw attention to the principal points which should be recorded, and the order in which it will be advisable to take them. It must be understood that the subsequent observations are only intended to apply to surgical cases: medical cases being of a more occult and complicated character, require a more extended method of proceeding, and a different order in the record of particulars. The great point in recording surgical cases is, to give *all* the facts bearing upon the injury or disease under consideration, but to omit all others which, however interesting in themselves, have no relation to the particular case. Different reporters will bestow a greater or less degree of polish upon a case according to their command of language and powers of composition; but if the above cardinal rule be attended to, every scientific requirement will be complied with, and the annoyance of having an imperfect or over-written case will be avoided.

The following particulars must invariably be noted:

1. Christian and surname.
2. Age, condition (single or married), and occupation.
3. Late residence of patient (in case of inquiry after the patient has gone home).
4. Date of admission (day of month and year: or hour, if a case of accident or urgency).
5. Ward, and No. of bed.
6. Name of Surgeon under whose care the patient is admitted.
7. *The most palpable outward symptom* of the disorder for which the patient was admitted should then be noted in the plainest terms—thus, 'broken leg,' 'tumour of the thigh,' 'severe burn,' &c., &c.

In order to arrive at a clear understanding of the nature of the case, whether it be one of disease or accident, it will now be necessary to inquire into (8) *the history of the case* so far as the patient can give it. This will be extracted with ease from some patients, whilst others will wander into all kinds of irrelevant details, and can only be kept to the point by the most rigid cross-examination. It is in collecting these details that the case-taker's intelligence will be chiefly exercised; but if he will bear in mind the rule stated above, his duty will be much facilitated. Thus, in cases of accident, the nature of the accident and its immediate results to the patient should be briefly described (*e. g.*, a cab horse knocked the patient down, and the fore-wheel went over the right leg); also any medical attendance which the patient may have received before admission should be noted. It is to be borne in mind that all dates of cases should be recorded as days of the *month* and not of the *week*, or the report will be unintelligible in a short time.

This naturally leads up to (9) *the patient's condition on admission*, which must be ascertained from the officer who saw the case at first; and the physical condition of the patient should always be recorded—thus, faint from loss of blood, insensible, sober, drunk, &c.

These last particulars (9) will only be necessary in cases of accident, since in chronic cases the condition of the patient when seen by the case-taker will vary but little from that on admission.

10. *The patient's previous history* must next be ascertained, so far as it bears upon the probable result of the case, or the treatment. Thus, it will be important to record whether the patient is habitually sober or given to drink; whether a woman is some months advanced in pregnancy, or whether the thigh of the opposite side was fractured some years ago and has been shortened since that date. Again, in cases of disease, *e. g.*, tumour, the family history will have a direct bearing upon the question of malignancy, and so also the previous existence of other tumours, the amount of pain experienced, &c. It will be well to ascertain whether the patient has resided habitually in town or country, and whether he has been engaged at any time in occupations of an injurious tendency. It will be advisable also in many cases, and particularly in the case of children, to obtain further information from the parents or friends when they come to visit at the hospital.

11. *Description of case.*—This gives a wide field for the case-taker's ability to show itself, for nothing is more difficult than to give a good verbal description of morbid appearances.

In the simpler cases a few lines will suffice, thus: 'There is a simple transverse fracture through the right humerus, immediately below the insertion of the deltoid, with a small effusion of blood into the surrounding tissues, and a bruise on the outer side of the arm, over the seat of fracture. No other injury.'

More complicated cases of disease or injury will require more elaboration, and the reporter should endeavour to elucidate all those points which will assist the surgeon in making his diagnosis. Thus, in the case of a tumour of the breast: 'In the lower part of the left breast a tumour of the size of a large orange is developed. The surface of it is smooth, and the skin can be made to glide over it, *the nipple being quite normal.* The tumour is freely moveable on the subjacent tissues, and its boundaries can be distinctly made out. At one point in the lower part of the tumour an obscure sense of fluctuation is perceived. There is a little pain present occasionally in the tumour, but it is only of a dull aching character. There is no enlargement of the axillary or cervical glands, nor any other tumour in any part of the body.'

In all cases of surgical disease, the condition of the thoracic, abdominal, and genito-urinary organs should be investigated, and the fact that they have been examined and found normal or otherwise should invariably be noted. The general appearance of the patient (full-bodied, cachectic, &c.) should be noted, and whether he presents any indication of a scrofulous or tubercular diathesis.

If the case-taker can give a little drawing of the appearances of the disease, though only a pen-and-ink sketch, it will add much to the value of the report.

12. *Diagnosis and remarks of surgeon.*—These must be carefully reported, and the best way is to enter them roughly in a note-book at the time, and write them out carefully afterwards. A few lines will generally suffice, provided the case has been properly taken beforehand, but some surgeons have a weakness for dictating the whole case over again in their own words.

13. *Treatment.* — The treatment, both local and general, must be carefully noted; and in the case of fractures, &c., the apparatus used should be distinctly

named (long splint, MacIntyre, &c.), or if of unusual form, it should be fully described, and mention made of its inventor. The diet ordered must be recorded, and all prescriptions carefully copied, with the several ingredients under one another, and not in one line. When the form of book will allow of it, it is well to enter the prescriptions in the margin.

14. *Progress.*—In acute or urgent cases, the daily or even hourly condition of the patient should be reported; but in chronic cases, a report twice or three times a week is ample.

It is most important to record any new symptom at the time of its occurrence, since thereby the absurdity of noting the cessation of a symptom which has never been mentioned before is avoided. Also, precise terms should be used, and such vague statements as 'Is better to-day' be avoided.

Any remarks which the surgeon may make during the progress of the case should be recorded, and particularly any reasons he may assign for change of treatment, or for proposing operative interference.

15. *Operation.*—The steps of an operation should be most carefully described; thus, the fact of chloroform being administered or otherwise; the incision made (length and direction), and the instrument it was made with; the use of saw, bone-forceps, or other instrument; the amount of hæmorrhage (arterial or venous), and the method employed to arrest it; any unexpected occurrences during the operation; the dressings applied; and the condition of the patient when removed to bed. Any remarks upon the case which the surgeon may make in the operating-theatre should be taken note of, but it will not be necessary of course to recapitulate the history of the case, of which he will probably give a sketch to the spectators.

In the case of tumours, limbs removed for disease, &c., a minute account of the appearances of the diseased portions, as seen after removal, should be appended.

The history of the case must of course be resumed after an operation, and especial care taken to notice the state of the pulse and respiration; whether sickness is present or not; the administration of stimulants or anodynes, &c. The condition of the wound must be minutely described, whether there is oozing of blood, and if so, to what extent; whether suppuration is set up or the parts heal by first intention, and the nature of the dressings which are applied. Daily reports are essential for at least the first week or ten days after a severe operation; subsequently, longer intervals are allowable, but all important epochs should be recorded, *e.g.*, the first dressing, the coming away of the ligature from a main artery, the removal of stitches, the first time the patient leaves his bed, and the date of the final closing of the wound.

16. *Result.*—This must invariably be recorded. If favorable, mention should be made of the general condition of the patient at the time of his discharge, and more particularly of the results of the treatment to which he has been subjected. The date both of month and year must be carefully recorded, and also whether the patient is discharged to a convalescent institution or to his own home.

In the case of death, the date and hour of death must be recorded, and also if possible the mode of death. The record of the post-mortem examination should be appended to the case, and the condition not only of the part affected, but of all the organs of the body should be investigated, since the information thus collected may have an unexpected importance at some future time.

When a case is concluded, the name of the disease and the result should be placed at the top of it, for the sake of easy reference, and the dresser should sign his name at the end. In long cases which are carried on to a page at a little distance, double references should be given—'continued at p. —,' and 'continued from p. —.'

A case-book should be provided with a double index: in one, the names should be in the first column, in alphabetical order, for reference while the patient is in the house; but the second index should consist of several parallel columns, in which the following should be entered:—1. Disease (referred to each organ—thus, Urethra, stricture of; Breast, scirrhus of, &c.). 2. Name. 3. Age. 4. Date of admission. 5. Date of discharge or death. 6. Operation. 7. Result. The number of the page being placed before or after the other particulars, as most convenient.

TABLE FOR REPORTING A SURGICAL CASE.

1. Name.
2. Age and Condition, and Occupation.
3. Address.
4. Date of Admission (day of month and year).
5. Ward and Bed.
6. Surgeon.
7. Injury or Disease.
8. History of Case from Patient.
[9. Condition on admission.]
10. Patient's previous History.
11. Description of Case.
12. Diagnosis and Remarks of Surgeon.
13. Treatment.
14. Progress.
[15. Operation.]
16. Result.

CHAPTER XIII.

POST-MORTEM EXAMINATION.

The neat and satisfactory performance of a post-mortem examination should always be aimed at in hospital practice; while in private it is of still greater importance, to avoid offending the feelings of relatives by unnecessary noise, or wanton soiling of the clothes, furniture, &c.

The body being stripped and laid upon a table or the lid of the coffin, the house-surgeon should take notice of any external appearances which may be worthy of remark, and in cases of medico-legal investigation these should be at once noted with pen and ink. In the case of surgical operations, also, the appearance of the wound should be investigated before any further steps are taken.

If the head is to be examined, it should be taken first, since the appearance of the brain will be materially modified by the cutting of the large vessels of the heart, &c.

Examination of the head.—The head being raised to a convenient height upon a block or tripod-stand, the hair should be parted across the top of the skull from ear to ear. An incision down to the bone is then to be carried in the same direction across the top of the head, and *never* across the forehead. The scalp, being thoroughly divided, can be drawn forwards over the brow, and backwards over the occiput, being freed from the skull, when necessary, with the knife. A line is now to be marked with the knife all around the skull, necessarily cutting through on each side the temporal muscle; and the mistake is often made of carrying this line much too low, thus materially embarrassing the after-steps. It should pass about an inch and a half above the orbit in front, and half an inch above the occipital protuberance behind, while at the sides the line between these two points should be kept as high in the temporal fossæ as the shape of the head will allow.

In order to saw through the calvaria easily, the head must be held quite steady, and the saw must be sharp and used lightly. The best way is to stand on the left side of the corpse, to grasp the head firmly with the left hand, and place the heel of the saw on the frontal bone. A few firm but light backward and forward movements will soon cut through the outer table of the skull, and the cut can then be readily prolonged backwards. The head must be moved as may be most convenient; and when approaching the occiput, the operator will either have to stoop considerably to use the saw effectually, or must raise the back of the head to a suitable level. Having finished the left side of the head, the operator may either lean over, if he is tall enough, and continue the sawing on the right side, or, what is much easier, he may come round to the right side, and putting the heel of the saw in the extremity of the former cut, should carry it back to meet the one of the opposite side at the occiput. There are three points where the saw requires to be thoroughly applied, viz., at the occiput and at the anterior extremities of the temporal ridge on the frontal bone; but care should be taken not to carry the instrument so deeply as to wound the *dura mater* or brain.

In the hospital dead-house, where noise is of no consequence, it is unnecessary to saw through more than the outer plate of the skull, and the inner may be more expeditiously divided with the chisel and mallet; but in private houses the saw must be carried through the entire thickness of the skull, which must be merely "prised" open with the chisel, to which a handle should be fitted at right angles with the shaft, so as to give a leverage to the operator's hand. When the calvaria is very firmly attached to the dura mater, it may be either dragged off forcibly with the hook provided for the purpose, or a steel sound or staff (of which there is usually one in a post-mortem room) may be introduced between the two, and be made to tear through the adhesions. When the adhesions are especially firm, the shortest way of overcoming the difficulty is to divide the dura mater all round in the line of the incision, and remove skull-cap and dura mater together. The superficial parts of the membranes having been examined, they should next be opened in the following way:—The knife is carried round the cut edge of the skull and made to divide the dura mater, which can then be lifted up on each side, so as to expose the *falx;* this, being detached with the knife from its attachment to the ethmoid bone, can be drawn backwards, and the upper surface of the brain will be fully exposed. (If it is necessary to examine the sinuses of the skull, the superior longitudinal should be laid open before the *falx* is detached.)

To remove the brain.—Lift up the anterior lobes with the left hand, turning up with them the first pair of nerves. Next divide the optic nerves (second), which will be seen close to the *clinoid processes*, and immediately behind them the *internal carotid arteries* with the *infundibulum* in the middle line. The third pair will next be seen, and then the *tentorium cerebelli*, which is to be divided on each side by carrying the knife along the posterior margin of the petrous bone; this cut will divide the fourth nerves, and the fifth will be at once exposed, while the sixth, seventh, eighth, and ninth will follow in their natural sequence. Lastly, the knife is passed through the *foramen magnum* to divide the *medulla* and *vertebral arteries*, and the brain can then be lifted out.

Having been weighed, the base of the brain and the arteries should be investigated; and it may then be carefully sliced from above downwards, in order to examine the several parts of the organ.

The sinuses of the base of the skull may now be readily examined, by carrying the knife along their several situations.

To open the orbit.—This is best done from above, after the removal of the brain. The saw should be carried through the remainder of the frontal bone, at the inner and outer angles of the orbit, and these cuts can then be prolonged backwards through the roof of the cavity with the chisel. The triangular piece of bone thus marked out can then be tilted forwards, and the contents of the orbit will be exposed. If it is merely required to examine the eyeball, this can be more readily removed from the front, in the same way as during life, with a pair of scissors.

To remove the temporal bones.—This may be required in cases of deafness, or occasionally in fractures. The brain having been removed, the knife should be carried down outside the bone, so as to separate the auricles with the skin, which should be drawn down. The saw is then to be carried behind the mastoid process to the jugular foramen, and through the squamous portion up to the basilar process; a little force with the chisel, and a division of any soft parts with the knife, will then lift the bone from its place. The knife is next to be carried beneath the bone, to free it from its attachments to the lower jaw and pharynx, care being taken, however, to leave the Eustachian tube attached to the under surface.

To remove the spinal-cord.—The body being turned on its face over a block, so that the dorsal region may be well elevated and curved, an incision is to be carried from the occiput to the lower part of the lumbar region. All the muscular tissue is to be turned aside as far as possible with the skin, so that the vertebral arches may be fully exposed. With the saw a cut is then to be made on each side of the dorsal region, close to the articular processes, but sloping inwards towards the vertebral canal, and with the chisel these three or four arches can then be removed. A strong spine-chisel or rachet is next to be used, and the hook being inserted in the canal, it can be hammered through the arches for the whole length of the spine, and with a pair of bone forceps they can readily be removed in a few minutes; the dura mater will then be exposed, and must be divided to expose the cord. To remove the cord, the knife must be carried outside the dura mater, to cut through the nerves on each side, and the *cauda equina* below, when the cord can be readily lifted out, and sliced in various parts as may be necessary.

Chest and abdomen.—These cavities are generally laid open together by an incision from the root of the neck to the pubes. This cut, begun over the lower part of the trachea, should be carried along the centre of the sternum and down the bone, then only through the skin to the umbilicus, in a semicircle around that point, and so on to the pubes. Returning to the lower extremity of the sternum, the operator should then carefully deepen the incision, so as to open the cavity of the peritoneum for an inch or two; this being done, the first and second fingers of the left hand can be introduced, and will serve to hold up the abdominal wall, while the knife is passed between them, with its back to the intestines, and made to cut through the whole thickness of the muscles at once down to the pubes. The skin and pectoral muscles are then to be dissected off the sternum and cartilages of the ribs, which should be fully exposed.

Thorax.—The knife is now to be carried through the sterno-clavicular articulation on each side, which will be readily accomplished by placing the point close to the inner end of the clavicle and cutting downwards and outwards. The cartilages of all the ribs are next to be divided, and it must be borne in mind that the cartilage of the first rib will be found a little further from the middle line than either the sterno-clavicular articulation or the cartilage of the second rib. All the cartilages should be divided as near their respective ribs as practicable, and should be cut evenly on the two sides. In old subjects the cartilages of the ribs, and particularly the first one, are more or less calcified, and will require the application of the bone-forceps. The lower part of the sternum is now to be lifted up, and the attachment of the diaphragm divided; after which, by the division of a little cellular tissue, the sternum will be quite freed, and may be lifted off. If, as is generally the case, the pleuræ are very adherent to the sternum, they will be removed in part with that bone, and the lungs will be fully exposed. These are to be drawn forward and examined superficially, notice being taken of the amount of fluid in the pleural sacs. The pericardium is next opened by a vertical incision, and the heart exposed. (Any fluid in the pericardium, if its measurement is required, should be withdrawn with a syringe.)

The heart and lungs are best removed together, by cutting through the trachea, drawing it down with the left hand while dissecting it away from the œsophagus, then cutting across the great vessels at the root of the neck, and so dragging the whole contents of the cavity out together. The heart will be found to be attached to the diaphragm by the remains of the pericardium and by the vena cava, but these can be readily divided, and the organs removed for further examination.

The lungs are to be carefully sliced from above downwards, and the bronchi can be readily laid open, if necessary, by carrying a pair of scissors along the back of the trachea, and so into the bifurcation.

The heart may be either examined as it is, or separated by dividing the pulmonary vessels and the arch of the aorta, when the interior can be readily exposed. The cavities are best laid open in their natural order, *i. e.*, following the course of the blood.

The *right auricle* is opened by an incision from one *vena cava* to the other, and a second at right angles to it, into the auricular appendage.

To open the *right ventricle,* pass the forefinger through the auriculo-ventricular opening into the cavity, then push the knife through the anterior wall, well to the right of the septum, and, guided by the finger, transfix the ventricle, and cut downwards so as to make a sort of triangular flap. The finger, introduced into this opening, will then guide the knife towards the auriculo-ventricular aperture; and the tricuspid valve should first be examined from below, and then the auriculo-ventricular ring being cut through, it will be fully exposed. The finger will next guide the knife into the pulmonary artery, which is to be laid open, care being taken to pass the knife *between* the semi-lunar valves. The clots generally found on the right side of the heart should be removed, and the cavities washed out, so that they may be thoroughly examined before the left side is opened.

The *left auricle* will be exposed by a vertical cut through the posterior wall passing between the pulmonary veins of the two sides.

The *left ventricle* should be transfixed with the knife to the left of the septum, and opened in the same way as the right; and the mitral valve, having been examined from below, will be fully exposed by dividing the auriculo-ventricular ring. The finger should be passed into the aorta, to direct the knife between the valves, and the vessel may then be laid open, the knife necessarily passing through and destroying the pulmonary artery and valves.

The dissection of thoracic tumours, aneurisms, &c., will vary according to circumstances; but it will be always found much more satisfactory to dissect the tumour *in situ* than to remove it *en masse*, and attempt to examine it afterwards.

To examine the larynx.—An incision is to be made from the chin to the sternum, and the skin carefully dissected back for some distance. The knife is then to be pushed through the floor of the mouth, and made to detach it on each side from the jaw. The tongue can next be drawn down through the aperture thus made, and the knife made to divide the pillars of the fauces, and go well back to the vertebræ, so as to divide the pharynx. The tongue, larynx, and pharynx can thus be drawn down together, and either separated from the lungs or removed with them. The cavity of the larynx is best exposed from behind.

Abdomen.—The contents of this cavity having been fully exposed (p. 205), they should be first examined *in situ*, and then removed.

Stomach is removed, with its contents, by tying the œsophagus, and dividing it above the ligature, then placing two ligatures at the pylorus, two inches apart and dividing between them. The contents should be carefully set aside in any case of medico-legal inquiry, and the viscus laid open by carrying a pair of scissors along the lesser curvature.

Intestines, large and small, are to be removed together, by placing a couple of ligatures at the commencement of the *jejunum* and of the *rectum*, and dividing the intestine at these points. The large intestine should be separated from its attachments in its whole length, and turned over to the right side; then turning the small intestines in the same direction, and grasping the mesentery with the left hand, one sweep of the knife will free them from their attachment. The small intestines will be most readily prepared for examination by cutting off the mesentery with a pair of scissors, and they must always be *opened* on the side to which the mesentery was attached.

Pancreas, duodenum, and spleen will be fully exposed, and can be examined *in situ*, or readily removed if desirable.

Liver is most easily removed, by taking with it a piece of diaphragm, that is, if the thorax has been opened; if not, the ligaments must be divided, and the organ dissected away from the diaphragm. The *vena cava* will, of course, require to be divided both at the diaphragm and also below the liver; and any dissection within the abdomen should be finished before this is done, or it will be spoiled by the blood which pours out.

Kidneys can be extracted without interfering with the intestines, by turning them over to the opposite side, dividing the peritoneum in the lumbar region, and drawing forward the gland. The vessels and ureter must be divided to allow of its removal, and its interior is to be exposed by an incision along the convex border.

Bladder and rectum, uterus and ovaries, can be removed by dividing all the structures lying upon the floor of the pelvis close to the levator ani, and drawing them out of the cavity, severing at the same time the connexions at the sides. If it is desirable, however, to remove the bladder with the urethra, the following dissection must be made.

To remove the urethra and bladder.—The most satisfactory way is to remove also a portion of the pubes. The abdomen having been opened by the usual incision, it should be prolonged on to the upper surface of the penis, for a short distance, and the skin be separated from the body of that organ as far as the glans, where the penis may be divided; unless it is desired to remove the whole of the organ, in which case the foreskin must be cut, and reflected from it. An incision carried round the root of the penis, and through the scrotum to the anus, will then allow the skin with the testes to be reflected from off the front of the pubes. The saw should then make a vertical cut through the bone, about an inch on each side of the symphysis, and the bladder having been separated from its attachments in the pelvis and to the rectum, a few touches of the knife will isolate the part, so that the bladder, urethra, and penis can be removed in one piece. The symphysis may be afterwards divided, and the urethra and bladder be laid open from above, or otherwise, as may be most convenient.

No special directions can be given for the post-mortem examinations of injuries, tumours, &c.; a knowledge of anatomy, and of the use of the scalpel being all that is required for their due performance.

In all cases of post-mortem examination, care should be taken to restore the exterior of the corpse to its ordinary appearance. Thus, the head should be weighted to correspond to what it was before the brain was removed; the scalp should be carefully sewn up, and the hair arranged so as to hide the incision. The sternum should be replaced, and the abdomen and thorax sewn up from below, the thread being always entered on the under surface of the skin, and at regular intervals, while a long strip of plaister may be laid over all. If the rectum or vagina have been divided, their orifices should be sewn up, or fluid will pour out when the body is removed; and where the front of the pubes has been taken away, a piece of wood should be inserted between the innominate bones, so as to keep them steady. When the glans penis has been left, it will be sufficient to distend the skin behind it with cotton wool; but where it has been removed, a piece of liver cut to an appropriate shape, and secured in the foreskin with a stitch, makes a very passable substitute.

The neck should be stuffed with tow or cotton wool when the larynx has been removed; and where the eyeball has been extracted, a very good substitute can be made of a knuckle of small intestine, tied with a piece of thread, and inserted between the lids.

After any post-mortem or dissecting work, the house-surgeon should be most careful to cleanse his hands, and, if possible, change his clothes, before entering the wards or touching a patient. The hands should invariably be washed in *cold* water, and well brushed with a hard nail-brush. If then immersed for a minute or two in some of Condy's fluid, or in a very weak solution of chloride of zinc, and then washed again, all smell will be effectually removed, and the possibility of any infection being transmitted to the patients considerably lessened. Eau-de-Cologne sprinkled on the hands, and allowed to evaporate, is the most efficient agent for removing any slight remaining scent from them, after having been thus thoroughly washed. The practice of oiling the hands before commencing operations certainly diminishes the amount of absorption of offensive matter, but renders the holding of instruments difficult, and hence increases the probability of accidental cuts or scratches.

In case any injury is received in making a post-mortem examination, it is a safe precaution to wash the hands at once, to suck the wound, and apply a piece of plaister until the operation is completed, when water-dressing is the best application. It is not generally from evident cuts that the occasional danger arises, but from unseen scratches in a person out of health, and which are inoculated with the poison of some specially diseased body.

The record of the post-mortem appearances should be made at the time, and with the parts in view; for unless this plan is adopted, some important point is almost certain to be omitted. The easiest way is for the operator to dictate to a bystander, who can roughly report the particulars, which should be carefully written out immediately afterwards.

TABLE OF AVERAGE WEIGHTS

OF THE

ORGANS OF THE BODY.

Tabulated from QUAIN *and* SHARPEY'S '*Anatomy.*'

		Male.	Female.
Brain		49½ oz.	44 oz.
Cerebrum		43 oz. 15 dr.	38 oz. 12 dr.
Cerebellum		5 oz. 4 dr.	4 oz. 12¼ dr.
Pons and medulla oblongata		15¾ dr.	1 oz. ¼ dr.
Spinal cord		1 oz. 4 dr.	ditto.
Heart		11 oz.	9 oz.
Lungs	right	24 oz.	right 17 oz.
	left	21 oz.	left 15 oz.
Thyroid		1 oz.	2 oz.
Liver		53 oz.	45 oz.
Pancreas		3 oz.	ditto.
Spleen		6 oz.	5 oz.
Kidney		5½ oz.	5 oz.
Supra-renal capsule		1 dr.—2 dr.	ditto.
Prostate		6 dr.	—
Testis		1 oz.	—
Uterus (virgin)		—	7 dr.—12 dr.
Ovary		—	1 dr.—1½ dr.

FORMULÆ.

The following formulæ have been selected from the pharmacopœias of some of the metropolitan hospitals, and their number would have been larger but for the fact that many of the hospital pharmacopœias are out of print.

1. Collyrium Aluminis (Bartholomew's).

℞ Aluminis, gr. viij
Aquæ, f℥j. Liqua.

2. Collyrium Atropiæ Sulphatis (Guy's).

℞ Atropiæ Sulphatis, gr. iij;
Aquæ Destillatæ, f℥j. Liqua.

3. Enema Commune (King's).

℞ Sodii Chloridi, ℥j;
Decocti Hordei, f℥xii. Misce.

4. Enema Olei Ricini (Westminster).

℞ Olei Ricini, f℥ij;
Amyli, ʒj.

Rub the oil with the starch, and then, whilst rubbing, add boiling water.

5. Fomentum Papaveris (Westminster).

℞ Papaveris Capsularum Concis: vj;
Aquæ, Oiv.

Boil for a quarter of an hour, and strain.

6. Haustus Anodynus (Westminster).

℞ Liquoris Opii Sedativi, ♏xv;
Misturæ Camphoræ, f℥j. Misce.

7. Haustus Anodynus Salinus (Westminster).

℞ Liquoris Ammoniæ Acetatis, fʒij;
Liquoris Opii Sedativi, ♏xv;
Misturæ Camphoræ, f℥j. Misce.

8. Haustus Purgans (Westminster).

℞ Infusi Sennæ, fʒxj;
Magnesiæ Sulphatis, ʒiij;
Tincturæ Jalapæ, fʒj. Misce.

9. Haustus Rhei (Westminster).

℞ Potassæ Sulphatis,
Rhei Pulveris, āā ℈j;
Spiritûs Ammoniæ Aromatici, ♏xx;
Aq. Menthæ Viridis, f℥iss. Misce.

10. Injectio communis (King's), for Men.

℞ Zinci Sulphatis, gr. iij;
Liquoris Plumbi, ♏xx;
Aquæ, f℥j. Misce.

11. Injectio communis (King's), for Women.

℞ Aluminis,
Zinci Sulphatis, āā gr. x;
Decocti Quercûs, f℥j. Misce.

12. Injectio Cupri Sulphatis (King's), for Women.

℞ Cupri Sulphatis, gr. vj;
Aquæ, f℥j. Misce.

13. Linctus communis (King's).

℞ Tincturæ Opii, fʒj;
Acidi Sulphurici diluti, ♏lxxv;
Aceti Scillæ, fʒiss;
Sacchari Fæcis, ℥iv;
Aquæ, f℥iss. Misce.

***Dose.*—A teaspoonful.**

14. Linimentum Opii (Bartholomew's).

℞ Tincturæ Opii, f℥j;
Linimenti Saponis Compositi, fʒiij. Misce.

15. Lotio Ammoniæ Hydrochloratis (Bartholomew's).

℞ Ammoniæ Hydrochloratis, ℈ij;
Acidi Acetici, fʒiij;
Spiritûs Rectificati,
Aquæ Destillatæ, sing. f℥iij. Misce.

16. Lotio Rubra (King's).

℞ Zinci Sulphatis, gr. j;
Spiritûs Rorismarini,
Tincturæ Lavandulæ Compositæ, āā ♏xv;
Aquæ, f℥j. Misce.

17. Lotio Acidi Nitrici (Westminster).

℞ Acidi Nitrici Diluti, f ʒij;
Aquæ, f℥xvj. Misce.

18. Lotio Hydrargyri Flava (Westminster).

℞ Hydrargyri Bichloridi, gr. xvj;
Liquoris Calcis, f℥xvj. Simul tere.

19. Lotio Hydrargyri Nigra (Westminster).

℞ Hydrargyri Chloridi, ʒij;
Liquoris Calcis, f℥xvj. Misce.

20. Mistura Ætheris Chlorici (King's).

℞ Ætheris Chlorici, fʒj;
Pulveris Tragacanthæ Compositi, ʒiss;
Aquæ, ad f℥vj. Misce.

21. Mistura Plumbi Acetatis (London).

℞ Plumbi Acetatis, ʒj;
Acidi Acetici diluti, fʒj;
Aquæ destillatæ, f℥xij.

Dose.—f℥j.

22. Mistura Antimonii Tartarizati cum Opio (Westminster).

℞ Liquoris Antimonii Potassio Tart., f ℥j;
Tincturæ Opii, fʒj;
Magnesiæ Sulphatis, ʒiij:
Misturæ Acaciæ, f ℥iss;
Aquæ Menthæ Viridis, f ℥iij. Misce.

Dose.—f℥j.

23. Mistura Aromatica (Westminster).

℞ Confectionis Aromaticæ, ʒij;
Tincturæ Cardamomi Comp., fʒij;
Aquæ Menthæ Piperitæ,
Aquæ, āā f℥iv. Misce.

Dose.—f℥j to f℥iss.

24. Mistura Cathartica (Westminster).

℞ Magnesiæ Sulphatis, ℥j;
Infusi Sennæ Compositi, f℥v;
Aquæ Menthæ Piperitæ, f℥iij. Misce.

Dose.—f℥iss to f℥ij.

25. Mistura Diaphoretica (Westminster).

℞ Liquoris Ammoniæ Acetatis, f℥ij;
— Antimonii Pot. Tars., f℥ss;
Misturæ Camphoræ, f℥vss. Misce.

26. Mistura Diuretica (Westminster).

℞ Spiritûs Ætheris Nitrici, f℥ss;
Tincturæ Scillæ, fʒij;
— Cantharidis, fʒss;
Decocti Scoparii Compositi, f℥viiss. Misce.

Dose.—f℥j.

27. Mistura Magnesiæ cum Magnesiæ Sulphate (King's).

℞ Magnesiæ Carbonatis, ℥j;
— Sulphatis, ℥v;
Aquæ, Oiij. Misce.

28. Mistura Iodinii Co. (London).

℞ Iodinii, gr. j;
Potassii Iodidi, gr. xlv;
Aquæ destillatæ, ℥xij. Solve.

Dose.—f℥j.

29. Mistura Potassæ Citratis (Westminster).

℞ Potassæ Bicarbonatis, ʒiij ℈ij;
Aquæ, f℥viij. Misce.

Dose.—f℥ss or ℥j, with an equal quantity of the following:—

Acidi Citrici, ʒij ℈ij;
Aquæ, f℥viij.

30. Mistura Quinæ cum Ferro (Westminster).

℞ Quinæ Disulphatis,
Ferri Sulphatis, āā gr. xij;
Acidi Sulphurici Diluti, ♏xx;
Aquæ Menthæ Piperitæ, f℥viij. Misce.
Dose.—f℥j.

31. Mistura pro Tussi (Westminster).

℞ Aceti Scillæ,
Vini Ipecacuanhæ, āā f℥ss;
Tincturæ Opii, ♏xv;
Theriacæ, ℥j;
Misturæ Acaciæ,
— Camphoræ, āā f℥iij. Misce.
Dose.—f℥ss to f℥j.

32. Pigmentum Iodinii (King's).

℞ Iodinii, ʒj;
Potassii Iodidi, ℈ij;
Spiritûs Vini Rectificati, f℥j. Misce.

33. Pigmentum Iodinii Mitius (King's).

℞ Iodinii, ʒss;
Potassii Iodidi, ℈ij;
Spiritûs Vini Rectificati, f℥j. Misce.

34. Pilulæ Catharticæ (Westminster).

℞ Aloës,
Scammonii,
Cambogiæ, āā ʒj;
Terebinthinæ Venetæ, q. s. Divide into 48 pills.
Dose.—One or two.

35. Pilulæ Colocynthidis cum Calomelane (Westminster).

℞ Extracti Colocynthidis comp. ʒiv;
Hydrargyri Chloridi, ʒj. M. Divide into 60 pills.
Dose.—One to three.

36. Pilulæ Cupri Sulphatis cum Opio (Westminster).

℞ Cupri Sulphatis, gr. iij;
Opii Contriti, gr. vj;
Aquæ Destillatæ, q. s.;
Micæ Panis, ℈j. M. Divide into 12 pills.

Dose.—One or two.

37. Pilulæ Elaterii (Westminster).

℞ Elaterii, gr. vj;
Extracti Glycyrrhizæ, ℈j;
Sacchari Fæcis, q. s. Divide into 24 pills.

Dose.—One to four.

38. Pilulæ Calomelanos cum Opio (Westminster).

℞ Hydrargyri Chloridi, gr. xij;
Opii, gr. iij;
Confectionis Opii, q. s. Divide into 12 pills.

Dose.—One to three.

39. Pulvis Aperiens Effervescens (Westminster).

℞ Sodæ Potassio-Tartratis, ʒij;
Sodæ Sesquicarbonatis, ℈j. Misce.

To be dissolved in f℥iv of water, and taken with the following during effervescence:

Acidi Tartarici, gr. xiv.

40. Pulvis Jalapæ cum Calomelane (Westminster).

℞ Jalapæ, ʒiv;
Hydrargyri Chloridi,
Zingiberis, āā ʒj. Misce.

Dose.—gr. xv to ℈j.

41. Pulvis Rhei cum Calumba (Westminster).

℞ Rhei Pulveris, ʒj;
Sodæ Carbonatis exsiccatæ, ʒj;
Calumbæ Contritæ, ʒij. Misce.

Dose.—gr. x to ℈j.

42. Pulvis Rhei cum Hydrargyro (Westminster).

℞ Hydrargyri cum Cretâ,
Sodæ Sesquicarbonatis,
Rhei Pulveris, āā partes æquales. Misce.

Dose.—gr. x to gr. xv.

43. Pulvis Rhei cum Magnesia (Westminster).

℞ Rhei Pulveris, ʒj;
Magnesiæ Carbonatis, ʒij;
Zingiberis, ʒss. Misce.

Dose.—gr. xv to ʒj.

44. Pulvis Bismuthi Compositus (Guy's).

℞ Bismuthi Nitratis, ʒj;
Pulveris Tragacanthæ comp., ʒij. Misce.

Dose.—gr. x to ℈j.

45. Suppositorium Opii (Westminster).

℞ Pilulæ Saponis compositæ, gr. x.

DIET TABLES.

St. Bartholomew's Hospital.

FULL DIET.	HALF DIET.	BROTH DIET.	MILK DIET.
1 pint milk porridge (men).	1 pint milk porridge (men).	1 pint milk porridge (men).	1 pint milk porridge (men).
2 pints of tea (women).	2 pints of tea (women).	2 pints of tea (women).	2 pints tea (women).
14 oz. bread.	12 oz. bread.	12 oz. bread.	12 oz. bread.
½ lb. meat (cooked).	¼ lb. meat (cooked).	1½ pint broth.	1½ pint milk, or
½ lb. potatoes.	½ lb. potatoes.	6 oz. potatoes (mashed)	1 pint milk with arrowroot, rice, or sago.
2 pints beer (men).	1 pint beer.	¾ oz. butter.	¾ oz. butter.
1 pint beer (women).	¾ oz. butter.	gruel.	gruel.
1 oz. butter.			

Guy's Hospital.

FULL DIET.	MIDDLE DIET.	LOW DIET.	MILK DIET.
14 oz. bread.	12 oz. bread.	12 oz. bread.	12 oz. bread.
1 oz. butter.	1 oz. butter.	1 oz. butter.	1 oz. butter.
1 pint beer.	½ pint beer.	Tea with sugar.	2 pints milk.
½ lb. meat (cooked).	¼ lb. meat (cooked).		
	½ pint broth.		

Gruel or barley-water added to each diet as may be necessary.

DIET TABLES.

King's College Hospital.

MEN.

FULL.	MIDDLE.	MILK.	LOW.
12 oz. bread.	10 oz. bread.	12 oz. bread.	8 oz. bread.
½ lb. meat (uncooked).	¼ lb. meat (uncooked).	2 oz. rice (for pudding).	1 pint broth.
½ lb. potatoes.	½ lb. potatoes.	1½ pint milk.	½ pint milk.
¼ pint milk.	¼ pint milk.		
½ pint porter.			

WOMEN.

FULL.	MIDDLE.	MILK.	LOW.
10 oz. bread.	8 oz. bread.	10 oz. bread.	6 oz. bread.
6 oz. meat (uncooked).	¼ lb. meat (uncooked).	2 oz. rice (for pudding).	1 pint broth.
½ lb. potatoes.	½ lb. potatoes.	1¼ pint milk.	½ pint milk.
¼ pint milk.	¼ pint milk.		
½ pint porter.			

Westminster Hospital.

FULL.	MIDDLE.	LOW.
14 oz. bread.	10 oz. bread.	8 oz. bread.
½ lb. meat.	¼ lb. meat.	¼ oz. tea.
¾ lb. potatoes.	½ lb. potatoes.	1 oz. sugar.
½ pint milk.	½ pint milk.	½ pint milk.
3 oz. oatmeal, or	3 oz. oatmeal, or	
2 oz. rice.	2 oz. rice.	

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